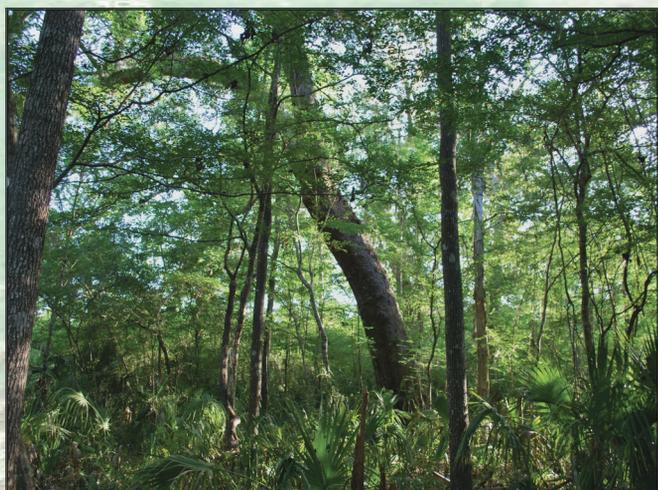


# Final Tarmac King Road Limestone Mine Environmental Impact Statement Levy County, Florida



Volume III  
Appendices I-N



U.S. Army Corps of Engineers  
Jacksonville District  
August 2013



# COVER SHEET

**Responsible Agency:** U.S. Army Corps of Engineers (USACE)

**Title:** *Final Tarmac King Road Limestone Mine Environmental Impact Statement (King Road EIS)*

**Location:** Levy County, Florida

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Comments or requests for information can also be submitted on the *King Road EIS* website at <http://www.kingroadeis.com>.

The official closing date for the receipt of comments is 30 days from the date on which the Notice of Availability of this *Final King Road EIS* appears in the *Federal Register*.

**Abstract:** The USACE is evaluating proposals for limestone mining and related activities in an area of Levy County known as the King Road site. The USACE has analyzed both offsite and onsite alternatives for those that could reasonably satisfy the project purpose, and has carried forward seven alternatives for mining for further detailed analysis, along with a No Action Alternative (Alternative 1). The alternatives include (1) the No Action Alternative; (2) Mining Outlined in Permit Application with Dedicated No Mine Areas in Wetlands and Uplands; (3) Exclusion of Mining or Related Activities West of Butler Road; (4) Mining Outlined in Alternative 3 with Exclusion of Mining and Related Activities Immediately South of Spring Run and in Higher-Quality Wetlands in the North-Central Portion of the Site; (5) Exclusion of Mining or Related Activities Between the Two Southern No Mine Areas; (6) Mining Only West of the Central North-South Aligned No Mine Area; (7) Exclusion of Mining or Related Activities West of the Central North-South Aligned No Mine Area, Between the Two Southern No Mine Areas, and South of Spring Run; and (8) Exclusion of Mining or Related Activities Between the Two Southern No Mine Areas and the Extreme Western Mining Block. Under the No Action Alternative, no mining would be permitted in wetlands within the Tarmac King Road Limestone Mine site. If the proposed mining is not approved, it is expected that the ongoing timbering operations and hunting activities on the site would continue. Under the other alternatives, mining would be permitted on the King Road site in varying degrees over the next 30 to 100 years. The affected environment is primarily the area immediately surrounding the King Road site in eastern Levy County. Analyses indicate that the environmental impacts are closely tied to the number of acres proposed to be mined, with alternatives proposing the largest amount of mining having the largest environmental impacts for most of the areas of concern. The primary discriminators are natural cover types, including wetlands; habitat units; potential impacts on the eastern indigo snake; hydrology; water quality; and socioeconomics. A mitigation plan has been evaluated that could offset many of the potential environmental impacts.

**Public Involvement:** In preparation of this *King Road EIS*, the USACE considered comments received from the public during a 60-day scoping period ending April 26, 2008. Comments were received via U.S. mail, fax, email, and through the project's website. In addition, comments were taken from two public scoping meetings held on March 26 and 27, 2008, in Levy County, Florida. A summary of comments received is found in Chapter 1, Section 1.7.1.

In addition, the USACE considered comments received from the public on the *Draft King Road EIS*. A Notice of Availability for the *Draft King Road EIS* was issued in the *Federal Register* (77 FR 29617) (see Appendix A) on May 18, 2012. A 60-day public comment period began on May 11, 2012, and ended on July 11, 2012. A public hearing was held in Inglis, Florida, on May 31, 2012, where the USACE accepted both written and oral comments. In addition, the public was encouraged to submit comments via U.S. mail, email, or the *King Road EIS* website. There were 225 comments received from the public and Federal and state agencies during the public comment period, with an additional 11 comment letters received after July 11, 2012. Chapter 1, Section 1.7.2, of this final EIS includes a summary of the public comments on the draft EIS. Comment responses and individual comment letters are included in Appendix I.

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**List of Acronyms and Abbreviations for Appendices**

CSM	conceptual site model
CY	calendar year
EIS	environmental impact statement
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
GHB	general head boundary
HELP	Hydrologic Evaluation of Landfill Performance
<i>King Road EIS</i>	<i>Tarmac King Road Limestone Mine Environmental Impact Statement</i>
LIDAR	Light Detection and Ranging
NGVD	National Geodetic Vertical Datum
PEST	parameter estimation software
SFWMD	South Florida Water Management District
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

**APPENDIX I**  
**COMMENT RESPONSE DOCUMENT**



# APPENDIX I

## COMMENT RESPONSE DOCUMENT

### I.1 OVERVIEW OF THE COMMENTS RECEIVED ON THE *DRAFT TARMAC KING ROAD LIMESTONE MINE ENVIRONMENTAL IMPACT STATEMENT*

In May 2012, the U.S. Army Corps of Engineers (USACE) published the *Draft Tarmac King Road Limestone Mine Environmental Impact Statement (King Road EIS)*. National Environmental Policy Act (NEPA) regulations mandate a minimum 45-day public comment period after publication of a draft Environmental Impact Statement (EIS) to provide an opportunity for the public and other stakeholders to comment on the EIS analysis and results. In this case, the USACE allowed for a public review period of 60 days. The public comment period began on May 11, 2012, and ended on July 11, 2012.

During this comment period, a public hearing was held in Inglis, Florida, on May 31, 2012, and oral comments on the draft EIS were taken. A court reporter was present at the hearing to record the public comments. In addition, the public was encouraged to submit comments via U.S. mail, email, or the *King Road EIS* website.

To facilitate responding to the public comments, they were considered as follows: (1) comments that took issue with information included in the draft EIS or presented new information for consideration in the EIS, (2) comments that stated either support or opposition to the proposed King Road mining activities, and (3) comments that agreed with information provided in the draft EIS.

A number of comments were received that stated support or opposition to the proposed mining activities. In addition, a number of comments were received that stated that the commentors agreed with the information presented in the draft EIS or that the proposed mining should take place for certain alternatives or under certain conditions. Responses to all comments are provided below. Where responses resulted in clarifications, additions, or modifications to the draft EIS, those impacted sections are referenced in the responses.

Except as noted, the full text of each comment may be found at the end of this appendix along with copies of all comment documents and the meeting transcript.

### I.2 PURPOSE AND NEED

**Comment 1:** Economics and need of the Florida Department of Transportation-approved aggregate was [sic] one of the key points that the applicant stated warranted the permitting of this mine. When considering economics, a key factor is the cost to the citizens of Florida who, in fact, through taxes, gas taxes, and assorted fees, licenses, and tolls in the state of Florida is [sic] ultimately buying this aggregate.

**Response 1:** Thank you for your comment. Socioeconomic impacts of the proposed project are discussed in detail in Section 4.15.

**Comment 2:** While there may be a need in the distant future, there is no immediate shortage from existing mines in the state. There is time to prepare for when the demand may one day outstrip supply. Take a step back and a deep breath and rather than permitting this mine, look at what could be the most practical and economic way to solve this issue of need.

Today there is no apparent shortage and none for the foreseeable future.

**Response 2:** A detailed analysis discussing the Primary Market Area and the projected need for affordable construction-grade aggregate in the future is included in Section 2.2.1. The USACE recognizes the commentor's opposition to the proposed mine.

**Comment 3:** Hey, you know, what's the reason for this? Well, there is a less costly alternative if aggregate is imported. Besides that, there's like 46 other mines within a 100-mile radius of here.

**Response 3:** A detailed analysis discussing the alternatives for providing the Tarmac market area with affordable construction-grade aggregate is provided in Section 2.2.1. This analysis includes a discussion of feasibility and costs using foreign suppliers, nearby harbors, railways, and nearby mines.

**Comment 4:** I think if we absolutely totally have to have this mine, which, you know, 30 years, that should be the most of it.

**Response 4:** Thank you for your comment.

**Comment 5:** And isn't that why we're having this [EIS] is to see what the human impact is on the safety and environment?

**Response 5:** Yes, Section 1.1 of the EIS cites the regulatory requirements that led the USACE to prepare the *King Road EIS*.

**Comment 6:** When different land use categories are identified and mapped by county authorities, consideration is given to compatibility of such benchmarks as noise, vibration, traffic density, air quality and hydrologic issues, etc. In this application review there are multiple conflicts which result from conversion of Forestry/Rural Residential category to heavy industrial use adjacent or in near proximity to residentially committed private properties.

**Response 6:** The zoning classifications of the King Road mine site and the surrounding areas are determined by Levy County.

**Comment 7:** In addition to comments on alternative supplies submitted in summary of the WAR public hearing testimony, the following discussion is provided.

The applicant contends that only limerock from their selected project site is suitable for large scale production of product meeting Florida Department of Transportation (FDOT) certification within the market area. The DEIS discusses availability of natural reserves of limerock likely to produce aggregate which meets FDOT certification standards. Vol. 1, Figure 3-21 delineates local deposits of Avon Park Limestone which rise sufficiently to make extraction practical. Otherwise the project area is overlain by the Ocala formation.

Vol 2, Entrix Figure 1 generally agrees with the aforementioned Fig 3-21. Entrix Figure 1, which is broader in geographic scope, depicts four such formations of Avon Park Limestone, one of which presents in the northeastern quadrant of Alternative 2. The graphic representation and rationale used to support the applicant's site selection is, from all appearances equally applicable to the existing Holcim US Crystal River Quarry located on the south shore of the Cross Florida Barge Canal. The Holcim US quarry has a FDEP ERP which provides for 4,815 acres of extraction and related activities. Holcim US owns approximately 6,000 acres in the area which is zoned for extractive use. Due to changes in Citrus County land use regulations, Holcim US can apply at will for expansion to the FDEP ERP successfully and gain ready access to formations of Avon Park limerock depicted in Entrix Fig 1.

The applicant stipulates that lower quality limerock in the proposed project area in the form of the Ocala Formation will be used for product markets other than FDOT. Further, it is indicated that some part of the Ocala Formation may produce FDOT grade limestone product (Vol 2 Florida Geology, Scott, Appendix 3). This formation overlies Avon Park Limestone formations in the majority of the project area, predominantly in the west and southern quadrants. Dr. Scott testifies that a single additional mine in Citrus County is certified by FDOT for road grade aggregate. As indicated in Attachment A, there are mining business plans at play in the market area which do not require FDOT certification. Such actions on the part of competitors do not mean FDOT quality aggregate is unavailable, only that such certification has not been sought.

WAR understands that FDOT is the largest customer of limestone products in Florida, but it is not the majority consumer. Overarching focus on FDOT quality aggregate in this analysis of need is inappropriate. The applicant suggests future developments such as the Progress Energy Levy power plant and Suncoast Parkway extension may serve as markets. The latter is presently unfunded and the

future of the Progress Energy project is far from clear due to very high costs estimated at \$22-24 Billion dollars.

Citrus County, Florida is somewhat of an anomaly in land use planning and category designation. Unlike most jurisdictions in the state, Citrus County has a designated extractive land use category. Mr. Joe Hochadel of the county's GIS Department (352.527.5239 x 7687) advises that the sum total of such designated lands total approximately 8,000 acres. Access to the county GIS data base is found at <http://www.bocc.citrus.fl.us/plandev/grcp/grcp.htm>

The DEIS references 30 USC 1601 as basis to recognize the fundamental economic benefit and contribution to the nation from limerock mining. WAR recognizes and accepts such findings, and at the same time suggests such determinations are national in scope. The Congress did not intend for such findings to be used to justify local or regional projects at the broader expense of the people or other natural resources, thus the Corps' involvement in evaluating the application at hand. The applicant has clearly and repeatedly referenced within the DEIS Volume 2 the company's "need". We consider this more properly described as a "want" and henceforth differentiate the public need from business goals or objectives. The Corps does not have authority to directly modify business strategies and such considers such factors of small consideration in this review. The applicant seeks market foothold in the region. The applicant will sell product to the appropriate market segment, be it base material or different grades of aggregate. The benefit to the public should be measured by comparison of socio-economic and esthetic gain versus loss.

Reference is made by the applicant to population growth in the region and product demand projected by Urban Economics (Vol 2, Appendix 1). WAR does not find uniform support for the projected population growth and product demand represented in the document. On one part reference is made to the North Carolina Geological Survey average annual demand, which is understood to be a broad national per capita projection. Extending such calculation to the dynamics of the applicant's market is thought inappropriate due to market specific demands. From a regional perspective there may be substantial differences in construction methods as compared to different portions of the country. They may present as road construction material (concrete vs. asphalt), home construction materials (frame vs. block or brick), vertical vs. sprawl development, or fill requirements due to the presence or lack of elevated terrain, etc. In short, market forces in northern or western regions of the U.S. may be wholly irrelevant to this region in Florida.

On the second part, review of population projections in the applicant's market area gives pause. The Urban Economics document projects a population increase in the market area of 33.72% in the timeframe of 2010-2030. WAR finds the presentation misleading due to gross differences in demographics in the market subset areas. Support for this position may be found within the Levy Nuclear Plant Units 1 and 2 COL Application Part 3, Volume 8, Section D, Environmental Report, CHAPTER 2, Section 2.5.1 ENVIRONMENTAL DESCRIPTION, beginning on page 2-460. This document is not provided by WAR as reference but is available to the Corps due to Section 404 review under the auspices of the NRC EIS. Contact Mr. Gordon A. Hambrick, Regulatory Division, Panama City Section, USACE, 850/763-0717 x 25.

Examination of Bureau of Economic and Business Research (BEBR) county analyses suggests that while the percentage of projected growth is high, the actual population numbers for many of the counties in the market area is [sic] quite low, especially to the north and west of the I-75 corridor. A high "growth rate" does not mean significant increase in numbers in such regions. They will remain consistent with the rural nature of these jurisdictions in the projected timeframe. Therefore, the primary market domain of the applicant will extend to the south and east. Access to all county BEBR analysis is available at:

<http://hodges.libguides.com/content.php?pid=20174&sid=1462831>

A work by Stanley K. Smith and Stefan Rayer who are part of the BEBR participants (Attachment I, Rayer CV) published "Projections of Florida Population by County, 2010-2040" (Attachment J) and suggested within is a looming trend for slower growth out to 2020. This is apparent now within Florida coastal regions and they note the significance of differentiating growth rates from absolute numbers. Further, they caution that mean percentage errors in long range projections increase in linear fashion as

the time horizon expands and that projections for specific counties are difficult to post with certainty. Such uncertainties become significant in any attempt to evaluate need for the Tarmac project.

The applicant stipulates vertical integration as part of its business model, meaning it desires to function independently from other market players. Tarmac wishes to mine, process and produce concrete and aggregate products sans collaboration with competitors. In order to do so it is necessary to convert a portion of aggregate production into concrete or Portland cement, presumably at facilities or batch plants in the market area. Review of the following link from Titan America of which Tarmac is a subsidiary, indicates few if any such facilities exist within a 100 highway mile radius market area. The closest is Clermont, Florida at 78.6 highway miles from Inglis. The premise of vertical integration does not appear to be fully developed by Tarmac or its parent company Titan America in context of the subject application.

[http://www.titanamerica.com/our\\_company/locations/florida/](http://www.titanamerica.com/our_company/locations/florida/)

The applicant stipulates in the DEIS Vol 2, Alternatives Analysis, certain costs associated with dislocation from the proposed project area to nearby supplies of Avon Park limestone (Vol. 1, Figure 3-21) and other barriers such as land acquisition resistance. Such costs involve increased expense for electrical transmission lines, transportation etc. We suggest generally that resistance to the sale by land owners is inversely proportional to offered price. Tarmac will gross approximately \$36 million/year based on 3 million tons annual production and the 2011 market value of \$12/ton. Given an extraction rate of 25 acre/year, a gross value of \$1.44 Million/acre is implied for the resource. At such time that land owners perceive that higher returns on investment over their lifespan can be generated by sale to mining interests, they will act to do so. In other words, market forces will resolve such issues. The applicant alleges northerly alternative locations (Area A and B, Vol 2, EntriX Figure 1) would meet more resistance from residents and the County Administration. WAR is at a loss to comprehend such assertions in light of DEIS Vol 2, Appendix 4, Fig 1 (population density). It is possible that land holdings in the vicinity of Area A and B held by a past County Commission Chairman have influenced the applicant's perception, but we find no explanation in the DEIS for either allegation.

WAR does not consider greater costs associated with locally dislocated project alternatives significant or worthy of the Corps' examination.

DEIS Vol 1, Pg 2-6, Table 2-1 summarizes mining productivity and product costs in adjacent states and several neighboring countries from 2002-2010. Production/demand in Florida, Georgia and Alabama peaked in 2006. However, costs associated with product have consistently increased despite the economic downturn that began in 2007. During the period of record, product from Georgia and Alabama were [sic] cost competitive with exclusion of transportation expense as compared to Florida through 2004. Since then the cost of limestone product in Florida has given competitive advantage to our neighboring states such that in 2010, Georgia product was approximately 14% cheaper. Alabama product was 31% cheaper. While product cost is a single component of cost to the user and the aforementioned costs do not include shipping expense, WAR notes that such disparity in raw product cost mitigates transportation costs substantially.

Limerock products procured from foreign points of origin indicate similar disparity with the exception of Canada, that being at parity with Florida production costs. The Bahamas are at rough parity with Alabama, but Mexico has a 45% cost advantage over Florida. The perceived advantage of foreign imports is based on landed value.

WAR recognizes transportation by truck is expensive and provides basis for the limits of the applicant's market area. We are also aware that transport by rail or ship is significantly more efficient and less costly per ton mile.

A note below Table 2-1 indicates exclusion of import duties and/or tariffs in cost analysis. Provisions of NAFTA and CAFTA exempt the aforementioned tariffs and duties for import category 2517 shipped from the countries reviewed. For further examination see the web links below, Attachment K, or contact Mr. Fred Schottman, Office of Tariff & Trade Agreements, (202) 205-2077.

[https://help.cbp.gov/app/answers/detail/a\\_id/277/~/harmonized-tariff-schedule---determining-duty-rates](https://help.cbp.gov/app/answers/detail/a_id/277/~/harmonized-tariff-schedule---determining-duty-rates)  
<http://www.gpo.gov/fdsys/pkg/CFR-2011-title19-vol1/pdf/CFR-2011-title19-vol1-sec24-24.pdf>

Citrus County has intent to develop the Cross Florida Barge Canal and adjoining land districts as Port Citrus. Limerock shipments by barge have been made from the Cemex Inglis Quarry (Barge Canal), and are underway on continuous basis by the Holcim US Crystal River Quarry which finds economic traction in shipping unprocessed limerock to Mobile, Alabama via barge. This demonstrates there is potential excess limerock capacity locally and also the economic feasibility of transportation as far as Alabama.

It is not clear to WAR that economic factors examined to date in this market are fully developed. We understand that long range truck transport is expensive but recognize there are fully developed rail networks throughout the target market area and existing terminals for sea transport. We note the Port of Tampa 70 mile radius includes the region of heaviest development activity and densest population within the applicant's projected market area. While recognizing that foreign supplies do not meet demand at present, we note foreign import tonnage has remained relatively consistent through the period of record in contrast with production/demand of Florida product and therefore conclude foreign sources of aggregate are economically competitive. We note that gross production tonnage in Alabama and Georgia, in total, consistently out paces [sic] that of Florida despite smaller sum population.

WAR concludes that market forces drive the industry far more efficiently than planning and that other transport modes may contribute substantial modification to the applicant's business plans over the 110 years of the project life. There is no clear and reliable mechanism for accurate forecasts over such extended timeframe.

**Response 7:** None of the Holcim mine parcel lies over the mapped Avon Park limestone formation, and a portion of the Holcim site does not fall within the radius from mapped formations used in the applicant's alternatives analysis. Whether through business decision or necessity, the Holcim mine currently transports its limestone product out of the market area to Alabama via barges. The Holcim site is also not available to the applicant as a reasonable alternative to mining the proposed King Road site, as it is owned and operated by a competitor company.

The USACE's alternatives analysis details the determinations made regarding locations of, and accessibility to, higher-quality aggregate. While zoning that could allow for mining activities in Citrus County may be extensive relative to other counties in the region, zoning is but one of many factors in site appropriateness and selection.

Obtainability of higher-quality limestone, including rock capable of creating Florida Department of Transportation (FDOT)-quality aggregate, is an important component of the project purpose and is appropriate given the relatively low availability of this material sourced from within the market area. The King Road Limestone Mine would not be reliant on the two projects the commentor references, as these would be relatively short-term in nature, and are only used as examples of projects the mine might serve.

Regarding overall need, it is appropriate to view long-term regional sources of aggregate material as contributing economically on a national scale. For example, road construction and commercial development have clear links to interstate commerce in Florida, which relies on Florida's tourism and agriculture industries, as described in Section 1.3.

The commentor's concerns about the applicant's population growth and aggregate consumption projections from Urban Economics are noted. The USACE did not rely on those projections, and instead performed independent analyses using U.S. Census and U.S. Geology Survey (USGS) data. These analyses are found in Section 2.2.1.

The commentor's assertion that the applicant's vertical integration as part of its business model is not supported due to the lack of Titan America batch plant facilities in the market area is noted but is outside the scope of the EIS. However, there are sufficient independent facilities available to Titan America within the market area that can convert aggregate into Portland cement to meet the purpose and need.

The commentor's point about landowners generally being more amenable to selling if a higher price is offered is noted. The USACE describes in Section 2.2.1.2 that in areas with multiple owners, acquisition would be more time-consuming, uncertain, and costly, and that one unwilling seller could prevent a site from being developed.

**Comment 8:** While it is useful to make long term projections for purposes of future land use and mitigation planning, such expectations are subject to change. In the context of planning, they are indeed expected to change. It is nonsense to make irrevocable decisions which commit the parties for 110 years amidst a vast sea of uncertainty. Assumptions used for climate, sea level impact, storm frequency and magnitude, aggregate market demand, out of state, in-state and foreign supply, transportation options, and transportation costs are all based on current conditions or historical observations and present no strong case for extrapolation of these factors to a 110 year horizon. We question whether projections made in 1902 would have adequately predicted market demand in 2012, much less the environmental and ecological impacts and consequences.

Project alternatives are reviewed thoroughly in the DEIS through both volumes. The analysis presented by the Corps regarding resource impacts or potential impacts are [sic] generally sufficient in scope to support selection of a preferred alternative without substantial modification to the alternative menu. Potential impact projection is however clouded by the proposed duration of the project and the uncertainty attendant to forecasts over such a lengthy period.

**Response 8:** The USACE appreciates the commentor's concern over the proposed duration of the project and the uncertainty of the impacts. The cumulative impacts of past, present and reasonably foreseeable impacts are discussed in Section 4.17. The USACE will take all of these factors into account when developing the Record of Decision (ROD).

**Comment 9:** On one part is the issue of public need, but on the other is potential harm to the public in context of the issues discussed previously in this document. The balance of economic synergy must not be negative or neutral in the end result of the project, but rather positive for all players. Forestry is infinitely repeatable as an economic model, mining is not. The contribution to the Levy County economy discussed in the BEBR documents regarding forestry and other economic activities are [sic], in and of themselves, positive net contributors. Revenues generated through recreational activity within Gulf Hammock and the adjacent Waccasassa Bay State Park is [sic] likewise theoretically infinite. There must be a clear and unambiguous benefit to the public if this project is to be allowed.

**Response 9:** The USACE appreciates the commentor's concern over the economic benefit of the existing land uses versus those of the proposed mine. However, the purpose of the EIS is to analyze the potential environmental impacts of the proposed action and the mitigation required to minimize those impacts. The USACE will take all of these factors into account when developing the ROD.

**Comment 10:** Detailed state permitting of this project by FDEP and as presently considered by the Corps extends only through a single 10 year construction phase and an additional 10 year operations phase. The Corps is asked by the applicant to issue a life of the mine permit for a period which will extend approximately 110 years. Initial phases of the project impinge on western regions of Alternative 2 which are profoundly vulnerable to tropical storm impacts.

**Response 10:** On November 1, 2010, the Florida Department of Environmental Protection (FDEP) authorized the applicant's full mining project as proposed. The Activity Description of FDEP's Environmental Resource Permit No 0244771-002 states that the estimated life of the mine, including reclamation, is 110 years, and the initial construction phase is 20 years. Impacts related to tropical storms are discussed in Section 4.2.1.

**Comment 11:** WAR differentiates the public need and applicant's desires. It is not clear the public need cannot be met by existing alternative supply sources. With fair consideration of federal code we conclude various complaints of economic barriers or geographic constraints of small significance in this review.

**Response 11:** Comment noted. A detailed analysis of existing alternative supply sources is included in Section 2.2 of the EIS.

**Comment 12:** The very nature of the proposed project life renders understanding of potential impact excursions problematic. There is no substantial testimony rendered by the applicant upon which to base projections extending for 110 years. Market forces are complex and difficult if not impossible to forecast into the next century. Unforeseen developments in transportation or market demand cannot be realistically forecast. One hundred and ten years ago heavier than air flight did not exist. 14 percent of

homes in the U.S. had bathtubs. There were fewer than 8,000 cars and 144 miles of paved road in this country. The population of Las Vegas was about 30. 20% of adults in the U.S. could neither read nor write. There were about 230 murders per year in the U.S. World Wars had yet to be conceived.

Given the ever accelerated pace of technological advance none of us can predict the future so far in advance, including the applicant.

**Response 12:** The USACE appreciates the commentor's concern over the length of the permit and the uncertainty of the impacts beyond a foreseeable time period. Table 2–3 depicts projected market demand for crushed rock. The USACE will take all of these factors into account when developing the ROD.

**Comment 13:** Plum Creek owns 70 percent of Levy County. This first special exception is a foot in the door. If it's granted they can lease to additional mines.

**Response 13:** Levy County's land use decisions and Plum Creek's ability to lease to additional permittees are outside the scope of the EIS.

**Comment 14:** If this issue was [sic] to be cited on the merits of the mining operation, it would be an open and shut case. There are virtually no merits to this operation at all.

**Response 14:** The purpose and need for this mine are evaluated in detail in Section 1.3.

**Comment 15:** Why -- my other question is why has the Army Corps decided on the hundred years? Having been in state government, local state government myself, I was also under the impression conditional use permits were of a transitory and brief period. You know, a hundred years seems like it's permanent.

**Response 15:** The applicant's request for this permit duration was based on approximately 100 years of proposed mining (Alternative 2), as described in Section 2.2.2.2. The USACE will thoroughly evaluate the information provided in the EIS, as well as the input from the public, on all of the alternatives before issuing the ROD.

**Comment 16:** The project purpose, if you will, or premise that the applicant based this application on is that there is a demand or a need for affordable aggregate in this market area. Now, the term affordable is key there because they never demonstrated anywhere that there's a critical need for this aggregate here.

If there was a critical need, the bonds [sic] of supply and demand and economics and substitution is going to make the aggregate available one way or another. We saw in the last decade a time when [sic] most commodities soared in price, things like concrete, lumbar [sic], and yet we kept building stuff as fast as we could at whatever price, no matter where we had to get that stuff from.

**Response 16:** A detailed analysis discussing the alternatives for providing the Tarmac market area with affordable construction-grade aggregate is provided in Section 2.2.1. This analysis includes a discussion of feasibility and costs using foreign suppliers, nearby harbors, railways, and nearby mines.

**Comment 17:** If we really had a need, the applicant -- I think the need is for the applicant to be able to mine this stuff and deliver it 70 miles and be competitive with the other suppliers. That's as far as I could get from the environmental impact statement. Seventy miles seems to be a key here. I don't know what cost that puts the aggregate at the outer circumference of the 70-mile ark [sic], but presumably if they go past that then they're running into supply at a lesser cost outside of that.

We've got 70 miles being the key here and yet other markets in Florida are being served from much farther away than 70 miles. Some of their supply is coming from Newfoundland, some of it's coming from Mexico, some is coming from the Bahamas. Jacksonville actually gets some of theirs from the lake fill which is presumably hauled on trucks, but it's much farther than 70 miles away.

We are dealing with a fairly low value commodity here. Most of the cost is in the transporting it. We don't know what the transportation situation's going to be over the next hundred years. We've heard mention of

a port right here in Citrus County. It's right close to Red Level which is the center of the market area that's mentioned by the applicant in here that they want to be able to serve. So I don't really see a critical need. Critical need is for commodities like fresh water, fresh air. It's not for aggregate.

**Response 17:** A detailed analysis discussing the alternatives for providing the Tarmac market area with affordable construction-grade aggregate is provided in Section 2.2.1. This analysis includes a discussion of feasibility and costs using foreign suppliers, nearby harbors, railways, and nearby mines. Port Citrus is discussed in Section 2.2.1.3.

**Comment 18:** A lot of the financial projections for alternatives to mining here seem to pick Reddick as the center of the service area, but when Tarmac America puts their transportation plan to the county, by my recollection 60 or 70 percent of the traffic was going through Citrus County where it was going southeast to the Orlando area to the very end of their economic range of 60 or 70 miles. So based on those projections, it's inconceivable to me that Reddick is the center of the distribution area and then using that as kind of the financial point where all these calculations come in is crazy.

**Response 18:** The projected costs to ship aggregate throughout the 70-mile radius were based on the aggregate from the Tarmac King Road Limestone Mine as the starting point. As described in Section 2.2.1.1, Reddick is close to the geographic center of the proposed service area and was selected to provide cost comparisons from shipping into the proposed service area from other potential aggregate sources. Much of the Orlando Market Area is outside the proposed market area for the Tarmac King Road Limestone Mine and was not evaluated in the EIS.

**Comment 19:** People don't want to listen to us and we live here.

**Response 19:** The public involvement process under NEPA is very important. Comments from the public scoping meeting were incorporated in the draft EIS, and comments from the draft EIS public hearing and comment period have been incorporated in the final EIS and will be evaluated for incorporation in the ROD.

**Comment 20:** The DEIS fails to address the regulatory required finding of need over the purported life (100 years) of the mine project.

**Response 20:** Long-term need is addressed in Section 2.2.1.1, and the USACE's decision on this topic will be documented in its ROD. Additional information on long-term need extending out to 2050 has been added to Table 2-3 of the EIS.

**Comment 21:** It's not going to help this area.

**Response 21:** Socioeconomic impacts, including the expected increase in employment and the local economy, are evaluated in Section 4.15.

**Comment 22:** It says a limestone aggregate including aggregate that meets the Florida DOT specification for building infrastructure to satisfy long-term public need. And if that doesn't raise a question. It does. And then you come down where you talk about, The Congress has noted the mining of such aggregate is essential for national security, wellbeing, and industrial production. That is just so broad and it sound specious. So I would readdress that.

**Response 22:** The process involved in the USACE's determination of project purpose and need is detailed in Section 1.3 of the EIS.

**Comment 23:** I write to express opposition to the proposed destructive rock mine in the heart of Florida's Nature Coast. This could have a serious negative impact on the lives and the communities in the area: from blasting and traffic to panther and black bear habitat damage.

**Response 23:** The USACE recognizes the commentor's opposition to the proposed mine. The impacts of all of the proposed alternatives, including those associated with blasting, traffic, and panther and black bear habitats are discussed in Chapter 4 of the EIS.

**Comment 24:** I must say, ripping up the State of Florida for profit is a terrible idea. The fragile ecosystems that exist no where [sic] else in the world have already suffered enough by the wanton destruction of developers to build housing stock that sits unoccupied across the state. If this company wants to turn a profit, why not develop a way to reclaim aggregates from existing structures and use it to build more compact and denser cities across the state that are leaner and use less resources. Pulling up the limestone that acts as a natural filter for the water resources is suicide. If there are no sources for fresh water, no one will be able to live in the new homes and drive on the new roads this aggregate will go into building. It is no secret that the north part of FL has the water the south part relies on to exist in its present form. The impact on the environment would be egregious and criminal. This is a short-sighted plan that would only benefit a small group of investors and not the people who actually live, work, or recreate in Florida. I encourage you to make the right decision and stand up to the forces of destruction that want to turn Florida into a golf course and pave paradise.

**Response 24:** The USACE recognizes the commentor's opposition to the proposed mine. The commentor mentioned reclaimed aggregates and impacts on freshwater. Section 2.2.1.5 of the EIS discusses recycling and Section 4.3 discusses impacts on water quality.

**Comment 25:** The DEIS notes that over the 5 years from 2006 to 2010, Florida produced over 430 million tons of crushed rock, with a peak annual output of 140 million tons in 2006. The DEIS also notes the demand for crushed rock is lower now than in the years leading to that peak demand in 2006, but states that "nonetheless, construction of housing units, nonresidential building space, roads and other infrastructure in west-central Florida will still result in the continued need for high-quality construction aggregate." EPA recommends that if more recent data is [sic] available on production rates and aggregate demand, the FEIS should be updated to reflect the newer data. EPA notes that the DEIS does not identify potential use of the rock for the proposed construction of the adjacent Levy Nuclear Plant, even though large quantities of aggregate will be needed for this multi-billion dollar and multiyear construction project if it is built.

**Response 25:** The USACE has updated the output and demand for aggregate data. Tables 2-1 and 2-2 have been revised to include updated information. In addition, Section 2.2.1.1 and Table 2-3 have been revised to include long-term aggregate need through 2050. Whether the applicant will enter into an agreement with Progress Energy to provide aggregate for the Levy Nuclear Plant (LNP) is unknown at this time and outside the scope of the EIS. The project is proposed to satisfy long-term public need in west-central Florida, and is not tied to a sole project.

**Comment 26:** There is much uncertainty about demands over 110 years. So much so that extrapolation of market supply, demand and sources, is essentially meaningless. We conclude that at present, there are viable alternative supplies. Over 110 years, market demand may change; other transport modes may contribute substantial modification to the applicant's business plans, and even appropriate types of construction materials may change with technology and new and improved vehicles. There is no clear and reliable mechanism for accurate forecasts over such extended timeframe.

**Response 26:** The USACE appreciates the commentor's concern over the proposed length of the permit and the uncertainty of the impacts beyond a foreseeable time period. Long-term need is addressed in Section 2.2.1.1 of the EIS, and the USACE's decision on this topic will be documented in its ROD. Additional information on long-term need extending out to 2050 has been added to Table 2-3 of the EIS.

**Comment 27:** There is no obligation on the public to assure that TARMAC can supply every need of every market. The focus on FDOT quality aggregate, as though FDOT is the only customer in this analysis of need is misleading. The applicant suggests future developments such as the Progress Energy Levy power plant be potential markets, but the future of the Progress Energy project is far from clear due to very high costs. Such uncertainties become significant in any attempt to evaluate need for the Tarmac project.

**Response 27:** The project purpose and need, as defined by the USACE is to "provide a source of affordable construction-grade limestone aggregate including aggregate that meets FDOT specifications..." (see Section 1.3). The Progress Energy Plant (see Section 4.15) is one of the many

potential future needs for aggregate in the Tarmac market area. Primary markets that could be serviced would also likely include projects within the Gainesville, Ocala, and Leesburg regions.

**Comment 28:** Limerock is currently supplied from Georgia, Alabama, and Mexico. Limerock shipments by barge have been made from the Cemex Inglis Quarry (Barge Canal) and by the Holcim US Crystal River Quarry to Mobile, Alabama, via barge, demonstrating both that there is already excess limerock capacity locally and also the economic feasibility of transportation as far as Alabama.

**Response 28:** A detailed analysis discussing the alternatives for providing the Tarmac market area with affordable construction-grade aggregate is provided in Section 2.2.1. This analysis includes a discussion of feasibility and costs using foreign suppliers, nearby harbors, railways, and nearby mines. The barges that transport limestone from the nearby Holcim US Crystal River Quarry to Mobile, Alabama deliver fuel for the immediately adjacent Progress Energy Plant. These barges might otherwise return empty to Mobile. This is a unique situation that is not applicable to other sites, nor does it provide much usable information about transportation feasibility or local capacity.

**Comment 29:** The applicant's 90 mile radius projected market area overlaps the market area of the Port of Tampa, which shows the feasibility of supplying the proposed TARMAC market with product transported by ship or rail from product imported into Tampa.

**Response 29:** The applicant's proposed market area radius is 70 miles and does not currently include the Port of Tampa. The feasibility of utilizing the Port of Tampa to provide the Tarmac market area with affordable construction-grade aggregate is provided in Section 2.2.1.3.

**Comment 30:** Section III.B of the Tarmac DEIS Appendix also references "Tarmac's Need for A Long-Term Supply of High-Quality Limestone" that "meets FDOT-specifications for quality aggregate (p. 9). In addition to the mined limestone from the proposed Tarmac mine that the Tarmac DEIS stated would be used to construct the proposed LNP...

**Response 30:** The reference to the Progress Energy LNP discussed in Section III.C of Appendix C is just one of the many potential future needs for aggregate in Tarmac's proposed market area. The *King Road EIS* does not state that mined limestone from the Tarmac King Road Limestone Mine would be used to construct the proposed LNP. Although it is possible that any limestone mined could be used to construct the proposed LNP, there is no requirement that it be used there.

**Comment 31:** With respect to the remaining alleged purposed of the proposed Tarmac mining neither the DEIS nor the final EIS for the proposed LNP included an adequate analysis for alternatives for meeting existing and future energy needs. The proposed LNP would be constructed approximately two miles east and on the opposite side of U.S. Highway 19 (US-19) from the proposed Tarmac mine. Neither the LNP DEIS nor final EIS included an adequate analysis of initiating mandatory conservation alternatives and initiating rooftop solar alternatives, using existing rooftop. Both of those alternatives would require no mining of limestone to meet existing and future energy needs. Those inadequacies in the LNP DEIS and final EIS were addressed in my previous comment letters on the LNP DEIS to the Corps and NRC.

**Response 31:** The commentor's concerns regarding existing and future energy needs are outside the scope of the EIS.

**Comment 32:** There is no sound basis for approval [of] a permit for Alternative 2 or for a period of 110 years in any scenario.

**Response 32:** Long-term need is addressed in Section 2.2.1.1 of the EIS, and the USACE's decision on this topic will be documented in its ROD. Additional information on long-term need extending out to 2050 has been added to Table 2-3 of the EIS.

### I.3 ALTERNATIVES

**Comment 33:** There is the economics of importing the aggregate from outside the state, whether it is Alabama, Mexico or the Caribbean, that should be given more consideration. What was not considered thoroughly was the Citrus Port project that currently has shipped aggregate via barge. The proposed barge transportation from this port on the Cross Florida Barge Canal could provide an excellent opportunity to import aggregate at reasonable costs.

In the study it showed how aggregate from outside the country and state actually cost less per ton than that being mined in Florida. The one caveat to this was the shipping costs from the Port of Tampa, Jacksonville, Port Canaveral would eat up any cost savings.

One factor that was not explored was again the Port of Citrus which currently has been shipping lime rock out of the area to the Tampa area. The Port of Citrus which has already been designated a port has just in the past two years taken a new life. If aggregate were to be shipped into the Port of Citrus, this would provide a cost savings to the citizens of Florida while almost totally minimizing and eliminating all other negative impacts.

**Response 33:** In 2011, Port Citrus was added to the Florida Seaport and Economic Development Council as the 15th deepwater port in Florida. Port facilities do not currently exist there; however, the Citrus County Port Authority is undertaking a feasibility study in an effort to establish a port. The port would be located along the Cross Florida Barge Canal, and the proposed Tarmac King Road Limestone Mine is regarded by Citrus County as a high candidate for port recruitment. The lower costs associated with sea transport could expand the potential market area of the proposed mine. Currently, there are no plans for the port to import crushed rock. The depth of the Cross Florida Barge Canal is a limiting factor on vessel size, and the Citrus County Port Authority states that its predominant clients will likely be barge-based operations. This would influence the distance to viable sources and destinations of imports and exports, including limestone aggregate. It will likely be several years before any development begins and materials begin to flow in to and out of the port. Section 2.2.1.3 has been revised to include Port Citrus information.

**Comment 34:** There are many points that when the cumulative impact is considered, the Army Corps of Engineers should only consider the option of no mining.

**Response 34:** The USACE notes the commentor's request in favor of the No Action Alternative.

**Comment 35:** Yet, we're speaking here of an area being done of 2,900 acres, 120 feet deep, which I think far outweighs my four acres...

So I really would think that before any permits are even considered, that the environmental impact study needs to be gone over once again and those areas that I've just mentioned which is in the karstology [sic] needs to be studied, but I would prefer that the Corps took on their number one option here. This whole thing has been a mess to be honest with you.

**Response 35:** The potential geological impacts are discussed in Section 4.7 of the EIS. The USACE notes the commentor's request in favor of the No Action Alternative.

**Comment 36:** In our opinion, this reasonably requires selection of an alternative that is not at risk from that factor because essentially it would be inundated and you have a tropical storm or cyclone risk.

**Response 36:** The USACE's selection of the preferred alternative will be based on a number of factors, including the potential impacts of tropical storms. The impacts of these storms for each alternative are included in Section 4.2.1.

**Comment 37:** To be clear, W.A.R supports Alternative 1 which is the no mining option.

**Response 37:** The USACE notes the commentor's request in favor of the No Action Alternative.

**Comment 38:** Should the Corps feel compelled to pick another alternative in this process, they would logically run into our -- from our perspective anyway, three through eight of the alternatives would all present less risk than Alternative 2. They would still provide aggregate based for the need of that material.

Due to the uncertainty created by the length of this project, if the Corps is propelled [sic] to select one of these, we suggest Alternative 7.

**Response 38:** Thank you for your comment favoring Alternative 7 if the No Action Alternative is not selected.

**Comment 39:** Lacking application of appropriate data to water budget calculations, WAR must support Alternative 1.

**Response 39:** The USACE notes the commentor's request in favor of the No Action Alternative. The USACE evaluated surface water and groundwater in Sections 4.2 and 4.3, respectively.

**Comment 40:** WAR recommends Alternative 1 as the preferred alternative at the conclusion of formal review of the application. We do not perceive sufficient evaluation of long term risks by the applicant, or examination of certain impacts due to Sea Level Rise and tropical storms. We find no evidence which supports suggested mitigation of impacts resulting from blasting vibration beyond year 40 of project Alternative 2. There is no credibility whatsoever to be found in any forecast extending to the end of the proposed 110 year project life of Alternative 2.

**Response 40:** The USACE notes the commentor's objection to Alternative 2. Impacts from sea-level rise are described in Section 4.2.1, and blasting impacts are described in Section 4.7.4.

**Comment 41:** We are mindful that our understanding of the Section 404 review underway for this application is imperfect and the Corps may be obliged to select a different preferred alternative than Alternative 1. Given such circumstances it is clear that direct adverse impacts are more or less proportional to Alternative acreage and it is also clear that some protections against tropical storm impacts are found at higher terrain elevations in the eastern portions of Alternative 2. The shorter project terms which correlate to alternatives 3-8 lend time inverse validity to applied assumptions and forecasts suggested by the applicant.

If there must be determination of a preferred alternative which allows development of this project, WAR suggests that contingent upon comprehensive analysis of tropical storm and SLR impacts, Alternative 7 is the only reasonable choice for the following reasons:

- 1) Compatibility and wetlands impact is minimized.
- 2) The highest quality limerock is most accessible within this alternative.
- 3) Development projects such as the Progress Energy Levy power plant and Suncoast Parkway extension are at best speculative at this time. The square of speculation is uncertainty.
- 4) Potential hydrology impacts, direct and indirect are minimized.
- 5) Should the Corps elect to entertain further evolution in this project, it will have a better data and experience base with the project as Alternative 7 nears conclusion. WAR does not favor multiple reviews of this project but fully recognizes such decisions are not within our purview.

**Response 41:** Under NEPA (42 U.S.C. 4321 et seq.), the USACE is to evaluate the impacts of all alternatives, including the No Action Alternative (Alternative 1). The USACE will base its decision on its evaluation of the impacts of all alternatives.

**Comment 42:** I'm proposing Alternative 7. I think that was great for you to come out with these alternatives because you haven't made up your mind which one you would go with.

**Response 42:** Thank you for your comment favoring Alternative 7 if the No Action Alternative is not selected.

**Comment 43:** PLEASE use “No Action Alternative” 2.1.3.

**Response 43:** The USACE notes the commentator’s request in favor of the No Action Alternative.

**Comment 44:** I would personally like to see the least damaging alternative. And whichever alternative, I can’t remember which of the numbers, that suggested the 30 years, that is what if the applicant, naturally this is a democracy, has a right as long as he stays within legal parameters to have a business, then that would possibly be the most desirable compromise.

**Response 44:** Thank you for your comment favoring an alternative that would allow mining for 30 years if the No Action Alternative is not selected.

**Comment 45:** I would prefer that you not issue this permit, Alternative 1. However, you know, if it is necessary, number seven looks like the best choice possible.

**Response 45:** Thank you for your comment favoring Alternative 7 if the No Action Alternative is not selected.

**Comment 46:** My second question is why are Alternatives 2 and 5 not being completely discarded seeing as how they are being -- are unable to be mitigated by the project designs? It would seem to me if their impacts cannot be mitigated, these alternatives should not be considered.

**Response 46:** The NEPA process requires that all reasonable alternatives be evaluated. The EIS includes evaluating eight alternatives; the USACE will look at the potential environmental impact of each alternative, as well as the public input received during the comment period before making a decision. Thank you for your comment.

**Comment 47:** Critical need has not been established, but we have established that there are impacts to critical resources and I would propose that the only appropriate scenario or alternative is number one.

**Response 47:** Thank you for your comment favoring the No Action Alternative. Project purpose and need is discussed in Section 1.3.

**Comment 48:** The DEIS must include a discussion of additional alternatives that are consistent with a reasonable period of demonstrated need (i.e. 20-30 year project life).

**Response 48:** Chapter 2 and Appendix C provide a detailed analysis of alternatives that include mining timeframes at existing mines, reduced mine footprints at the proposed King Road site, and Tarmac’s request for approximately 100 years of mining. Long-term need is addressed in Section 2.2.1.1 of the EIS, and the USACE’s decision on this topic will be documented in its ROD.

**Comment 49:** It is clear from the discussion in the DEIS that there are numerous alternatives that would both meet the applicants [sic] purported need for aggregate for a reasonable period of time (20-30 years) and avoid and minimize impacts to wetlands. In fact, Alternative 7 would avoid and minimize to the greatest extent the impacts to wetlands and other habitats while still supporting the production of aggregate at the site for 30 years or more

**Response 49:** The USACE notes the commentator’s request in favor of Alternative 7.

**Comment 50:** We do not support this project and urge its rejection. Citrus County Audubon Society will only support Alternate 1 - no mining.

**Response 50:** The USACE notes the commentator’s request in favor of the No Action Alternative.

**Comment 51:** There are now statistics showing that importing limestone would be less expensive than the cost to produce limestone from the Levy County mine.

**Response 51:** The cost per ton of importing limestone from suppliers within the United States, as well as foreign suppliers was discussed in Section 2.2.1.1 and presented in Tables 2–1 and 2–2, respectively. Transportation costs to the point of use are not included in these tables. The data presented were based on the latest 2012 data available from the U.S. Bureau of Labor Statistics and the U.S. International Trade Commission. The data have been updated with the latest information available as of May 2013.

**Comment 52:** Although the EIS has provided a detailed explanation of this project's potential impacts to the surrounding environment, it is very difficult to predict the full level of impact this project may have over the 100 year period during which the mine would be operational. Because of this uncertainty, as well as the concerns listed above, we feel that Alternative 1, "No Action," is the best choice to protect the environment and the water supply. However, should a compromise be necessary and a decision from Alternative 2-8 must be made, we would prefer to see Alternative 7 selected. This alternative would have the lowest direct impact to wetlands, the highest functional gain of wetlands after mitigation, and the lowest risk of flooding as the site is the furthest east of Alternative 2-8.

**Response 52:** Thank you for your comment favoring Alternative 7 if the No Action Alternative is not selected.

**Comment 53:** The DEIS notes that higher-quality Florida limestone is primarily mined from four designated resource areas: the Lake Belt, Charlotte-Lee County, Sumter-Hernando Citrus County, and the Taylor-Dixie-Big Bend area. The DEIS reports that the quality of Florida rock available from non-Lake Belt supply areas "has been steadily declining." To support this assertion, EPA recommends that more information be provided in the DEIS about the rock quality trends of these non-Lake Belt areas. EPA also recommends that Table S-I. 2001-2010 Averages, Peak, and Projected Demand/or Crushed Rock Based on Current and Projected Population Growth in Florida and the Tarmac Primary Market Area be updated if the data is [sic] available.

**Response 53:** The data in Tables S–1, 2–1, and 2–2 have been updated to include the most updated data available as of May 2013. The decline in quality of Florida rock available from non-Lake Belt supply areas was the finding of FDOT in its *Strategic Aggregates Study* and is detailed in Section 2.2.1.1 for each designated resource area.

**Comment 54:** I recommend option 1 - NO MINING, and my alternate option, 7

**Response 54:** Thank you for your comment favoring Alternative 7 if the No Action Alternative is not selected.

**Comment 55:** It is utter nonsense, however, to make irrevocable permitting decisions extending out 110 years based on such projections. Assumptions used for climate, sea level impact, storm frequency and magnitude, aggregate market demand, out of state, in-state and foreign supply, transportation options, and transportation costs are all based on current conditions or historical observations and there is no reason to believe these can be accurately projected out 110 years. We question whether projections made in 1902 would have adequately predicted market demand in 2012, and much less the environmental and ecological impacts and consequences. A Far Shorter Permit Period Would Better Protect the Public [sic] Interests and Should be of No Detriment to TARMAC We see no rational, nor any urgency, for approval of any Alternative for issuance of a permit of the duration requested by the applicant TARMAC asserts there are market needs for 110 years. TARMAC asserts that it can effectively manage environmental and ecological impacts such that there is no degradation in our environment and quality of life over 110 years. If these assertions by TARMAC are true, and if TARMAC truly is confident in them, then TARMAC should see no risk with a permit of shorter term. The demonstrated success of their project after 20 years, economically and environmentally should make them confident in applying for future phases based on track record. Given the deficiencies noted above, Alternative 1 is the only Alternative that provides protection of our environment. We do not perceive sufficient evaluation of long term risks by the applicant, or examination of certain impacts due to SLR and tropical storms. Effective mitigation areas which will last the duration of the proposed project period are not provided. Alternative 7 results in less wetland impacts and some minor protection against tropical storm impact in the very near term and would be the only other Alternative that should be considered

**Response 55:** The USACE understands the commentor's concerns for the uncertainty of environmental impacts and projections of need for a mining permit extending out 110 years, as proposed in Alternative 2. The USACE has evaluated six additional alternatives in the EIS with shorter mining timeframes. Long-term need is addressed in Section 2.2.1.1 of the EIS, and the USACE's decision on this topic will be documented in its ROD. Additional information on long-term need extending out to 2050 has been added to Table 2–3 of the EIS. The USACE will thoroughly evaluate the information provided in the EIS, as well as the input from the public on all of the alternatives before issuing the ROD.

**Comment 56:** The alternatives analysis for the Tarmac DEIS (Chapter 2) does not consider alternative materials for construction of the referenced roads, hospital and community college that would not require filling of wetlands. This failure is despite the fact that less environmentally destructive materials that don't require mined limestone and filling wetlands are readily available and are more economical. For example structures have been constructed in Florida and throughout this and other countries using less harmful and more energy-conserving materials such as repurposed tires, glass and styrofoam. In fact, Australia and New Zealand are examples of countries now using crushed glass bottles for road construction. The fact that FDOT and other alleged markets for the proposed Tarmac limestone have not considered alternative, less environmentally destructive materials for construction that require no filling of wetlands does not relieve the Corps and other federal agencies from the requirements to consider alternative materials in the DEIS when alternative materials can be and are being substituted for virgin raw materials proposed for mining.

**Response 56:** The USACE recognizes that limestone mining is not a water-dependent activity; therefore, filling of wetlands is not a requirement to acquire limestone. The USACE evaluated no action alternatives, which included mining only in uplands to acquire limestone; this would not meet the project purpose, as described in Section 2.1.3. Using other materials for construction, such as recycled glass as aggregate for roads, has been occurring in the United States for years; however, the supply of these materials is not sufficient to replace stone aggregate. The EIS has been revised in Section 2.2.1.5 to reflect this.

**Comment 57:** In summary, the evidence provided in the sworn testimony, exhibits and other attachments incorporated into this comment letter by reference is sufficient for the Corp [sic] choose the "No Action" alternative and to deny the proposed Tarmac mine.

**Response 57:** USACE notes the commentor's request in favor of the No Action Alternative. This letter contains several comments about the need for a supplement to the *King Road EIS* that have either been addressed elsewhere in this Comment Response Document, or are outside the scope of the EIS (comments related to conflict of interest over desalination, analysis of energy needs, or about the *Environmental Impact Statement for Combined Licenses (COLs) for Levy Nuclear Plant Units 1 and 2 [LNP EIS]*). Those comments are briefly summarized here for completeness. The commentor asserts that a supplement to the *King Road EIS* is required because there are significant new circumstances bearing on the proposed mining action and its impacts. The commentor supports this assertion with the following opinions: that none of the documents in Section 1.5 of the *King Road EIS* appear to provide a scientific analysis of adverse direct, indirect, and cumulative environmental impacts for the proposed Tarmac mine; that neither the *King Road EIS* nor the *LNP EIS* adequately considers adverse direct, indirect, or cumulative environmental impacts or provides an adequate analysis for alternatives for meeting energy needs; that the alternatives analysis in the *King Road EIS* is inadequate because it does not consider alternatives to limestone for construction materials; and that there is a conflict of interest with a specific contractor that supplies desalination plants and water treatment supplies.

The sworn testimony, exhibits, and other attachments incorporated by reference to which this comment refers are (1) related to the aforementioned conflict of interest and (2) testimony, pre-hearing affidavits, and exhibits submitted for Atomic Safety and Licensing Board (ASLB) hearings on the combined license application for LNP. Both of these issues are outside the scope of the EIS.

## I.4 SURFACE WATER

**Comment 58:** They weren't as much about the trespassing issue just for kids hanging out there, but it's what actually develops in those still areas, those waters, that sit there over time.

**Response 58:** Water quality in mine pits is not expected to become a health issue. The lakes would be deep, ranging from 60 to 120 feet deep, reducing the risk of eutrophication. There would be minimal nutrient loading entering the lakes from adjacent land use due to the protective berms. Some atmospheric deposition will occur, but the overall impact would be minimal. Section 3.1.2.1 of the EIS has been updated to include the latest rulemakings regarding surface water quality standards. Water quality certification authority has been delegated to the state of Florida under Clean Water Act Section 401. FDEP Permit No. 0244771-002 is the state authorization for the limestone mining and contains requirements for monthly and quarterly surface water quality monitoring under its Special Condition No. 60, "Mine Pit Water Quality Monitoring." As such, the applicant is required to report any exceedances of surface water quality standards as part of this permit.

For comparison, water quality in mined lakes has been monitored through a comprehensive program for the numerous aggregate mines in the Lake Belt region of Florida, with specific monthly, quarterly, and annual monitoring required by permits from 2010 to the present. The permit monitoring encompasses surface water in mined lakes and groundwater in monitoring well clusters at three depths, as well as pre- and post-blasting monitoring. Results indicate that for all water quality constituents of concern for drinking water, samples indicated concentrations below the laboratory method detection limit (MDL) or below the applicable groundwater or drinking water standards. These results also indicate water quality in the lakes and nearby groundwater samples does not exceed applicable water quality criteria and does not indicate negative effects on the lakes related to mining activities. This information has been included in more detail in revised Section 4.3.2.2 of the EIS.

**Comment 59:** WAR contends that uncertainty about the outcome of sea water loading of lake pits [is] worthy of special focus. Potentiometric gradients presented by the applicant (DEIS) in analysis of ground water movement suggest movement to the west or southwest depending on location in the project area and aquifer stage. Private residents to the west and southwest of the project area are dependent upon private wells for water supply. The potential for contamination by salt water appears high in such scenarios. At present there is no significant chloride contamination in ground water within or without [sic] the project area.

**Response 59:** The 19-foot berms (referenced to the National Geodetic Vertical Datum [NGVD]) surrounding open mine pits would be at the limits of a surge resulting from a Category III storm. The project is designed to withstand storm surge greater than that which would completely inundate the nearby communities of Yankeetown and Inglis. The impact of seawater introduction into the pits would create a temporary increase in pit water salinity. This phenomenon naturally occurs in estuaries and lakes proximal to the shoreline during large storm events, such as hurricanes. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from major hurricanes (Category III and above) that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years. Should this occur, the potential temporal effect of this infiltration has been shown to be minimal. A discussion on this potential impact has been added to Section 4.2 of the EIS.

**Comment 60:** It's against the state water policy and the Levy County water plan. Data summarized in the plan are water supply, source protection; water quality, surface and groundwater – note: Washing the lime rock adds the pollutant turbidity to water returned to the Florida aquifer – flood protection, floodplain management; and natural water – natural systems, ecosystem protection, minimum flows and levels of the Levy County water plan.

**Response 60:** Decisions regarding compliance with state and county policies and plans have been rendered by those entities, and are outside the scope of the EIS. Impacts generated from return water after rock washing were included in groundwater modeling performed by the USACE's third-party contractor, Science Applications International Corporation (SAIC). This is discussed in Appendix D, Section D.2.5.3.

**Comment 61:** Surface water flows from Spring Run will be affected by the project, impeding surface water flow across Levy County.

**Response 61:** No portion of the project would be sited within the Spring Run floodplain, and therefore would not impact flows from Spring Run. Surface water flow across Levy County would not be impeded, as activities in and around the flow-ways and intermittent streams found on the site would be limited to a few culverted crossings. Surface water impacts are discussed in Section 4.2.1.

**Comment 62:** Surface waters: The EIS states that all of the proposed alternatives have the potential to impact surface waters, both within onsite streams and constructed lakes and offsite within the watershed. As the waters from the project site will drain into Waccasassa Bay and the Big Bend Seagrass Aquatic Preserve, any impact to surface water will also have a negative effect on manatees, their aquatic habitat, and their primary food resource-seagrass. While the disturbed surface waters are intended to be restored after the mining is completed, which is presented as a method to minimize impact to on and offsite surface waters, mining will not be completed until after 100 years, by which time irreversible damage is likely to have been done. Furthermore, the status of our agencies to enforce this future mandate 100 years from now is unknown.

**Response 62:** The potential impacts on surface water quality for all alternatives are discussed in Section 4.3.1. With the implementation of standard best management practices, as well as the monthly and quarterly surface water quality monitoring required by FDEP Permit No. 0244771-002, the impacts on surface water quality either on or offsite were determined to be minimal. Lakes constructed through mining would also have no surface water connection to the waters the commentor references, or to other surface waters. The onsite streams that do drain to surface waters such as Waccasassa Bay would be avoided with the exception of a few road crossings. These onsite streams would also be surrounded by uplands and wetlands preserved in perpetual conservation easements as buffers, further reducing the potential for impacts on surface waters, sea grasses, or manatees. Mitigation of impacts on surface water quality is included in Chapter 5.

**Comment 63:** EPA has proposed numeric criteria for total nitrogen and total phosphorous for Florida surface waters. Site specific values indicated in the surface water quality database indicate these expanded ranges may be exceeded at the site. At the time the DEIS was being prepared, the proposed EPA criteria had not been finalized and therefore did not constitute regulatory standards. FDEP is currently working on state standards that may differ from EPA's proposed standards and could replace them if approved by EPA. The FEIS should be updated to reflect any future approvals of nutrients criteria.

**Response 63:** Subsections of Section 3.2.2.1 addressing chlorophyll a and nutrients have been revised with the most current information on U.S. Environmental Protection Agency (EPA) and FDEP water quality criteria. In December 2012, EPA accepted the FDEP numeric nutrient criteria, which include separate approaches for lakes, springs, streams, and estuaries. The new criteria have been added to the text and tables with evaluation of implications of available lake water quality monitoring data.

**Comment 64:** DEIS Appendix 3.16 "References" lists EPA's Section 303(d) List Fact Sheet for Watershed Waccasassa, which was accessed through EPA's Total Maximum Daily Load (TMDL) website and reviewed in preparation of the DEIS. It is unclear in the DEIS if any TMDLs have been approved for waterbodies within the proposed mining areas. If TMDLs are approved or established before the FEIS is published, the document should be updated to reflect these approvals. The FEIS should be updated for any recent TMDLs (DO, CBOD, nutrients, sediment, siltation and habitat alteration, etc.) and the most recent 303(d) (impaired waters) status of receiving/downstream waterbodies draining the mining lands.

**Response 64:** The most current Section 303(d) impairment information for the Waccasassa watershed (EPA 2012) indicates that the following waterbodies that receive surface water runoff from the mining site have been identified as impaired: Waccasassa River and Sheephead Creek, impaired for fecal coliform, dissolved oxygen, and mercury in fish tissue; and direct runoff to the Gulf of Mexico, impaired for fecal coliform and mercury in fish tissue. The total maximum daily load (TMDL) status for each of these waterbodies is that a TMDL is needed, but TMDL development has not been initiated at this time (probable sources contributing to impairments and TMDL alternatives have not been identified and no TMDL data are available).

**Comment 65:** EPA recommends that additional information/data be provided in the FEIS regarding how surface water quality could be impacted by the proposed limestone mining. For example, the FEIS could cite research (or collected data) that provides a comparable example of the expected impact on surface water quality. EPA further recommends that information be presented on the long term impacts of each alternative on surface water quality after restoration/reclamation.

**Response 65:** Water quality in mine pits is not expected to become a health issue. The lakes would be deep, ranging from 60 to 120 feet deep, reducing the risk of eutrophication. There would be minimal nutrient loading entering the lakes from adjacent land use due to the protective berms. Some atmospheric deposition would occur, but the overall impact would be minimal. Section 3.2.2.1 of the EIS has been updated to include the latest rulmakings regarding surface water quality standards. Water quality certification authority has been delegated to the state of Florida under Clean Water Act Section 401. FDEP Permit No. 0244771-002 is the state authorization for limestone mining and contains requirements for monthly and quarterly surface water quality monitoring under its Special Condition No. 60, "Mine Pit Water Quality Monitoring." As such, the applicant is required to report any exceedances of surface water quality standards as part of this permit.

As suggested by the commentor, research was done to determine if surface water quality in remaining lakes had been impacted by mining or post-mining restoration/reclamation in similar projects. Water quality in mined lakes has been monitored through a comprehensive program for the numerous aggregate mines in the Lake Belt region of Florida, with specific monthly, quarterly, and annual monitoring required by permits from 2010 to the present. The permit monitoring encompasses surface water in mined lakes and groundwater in monitoring well clusters at three depths, as well as pre- and post-blasting monitoring. Results indicate that for all water quality constituents of concern for drinking water, samples indicated concentrations below the laboratory MDL or below the applicable groundwater or drinking water standards. These results also indicate that water quality in the lakes and nearby groundwater samples does not exceed applicable water quality criteria and does not indicate negative effects on the lakes related to mining activities. This information has been included in more detail in revised Section 4.3.2.2 of the EIS.

**Comment 66:** In Section 3.2.2.1, the discussion regarding numeric nutrient criteria should be updated in the Final EIS to reflect the most current status. As you are likely aware, the Florida Department of Environmental Protection ("DEP") has proposed state numeric nutrient criteria that would incorporate regional and other situation-specific differences, which DEP submitted to EPA last month (June 2012) for approval. If DEP's proposal is accepted by EPA, the proposed nutrient and chlorophyll a concentration criteria will vary slightly from the proposed EPA values and will also vary somewhat by region within Florida. We anticipate EPA will take final action on DEP's proposed state numeric criteria by August 2012; EPA's final action on the state's proposal should therefore be reflected in the Final EIS.

**Response 66:** Subsections of Section 3.2.2.1 addressing chlorophyll a and nutrients have been revised with the most current information on EPA and FDEP water quality criteria, which is that in December 2012, EPA accepted the FDEP numeric nutrient criteria, which include separate approaches for lakes, springs, streams, and estuaries. The new criteria have been added to the text and tables with evaluation of implications of available lake water quality monitoring data.

## **I.5 HURRICANE SURGE**

**Comment 67:** One of the big ones is the life of the project as proposed. A hundred years makes uncertainty implicit about the future of this project. We think the project is extraordinarily vulnerable to tropical storm impacts and the range of tropical storms for Category 3 storms, you got approximately 22 storms in a period of record that struck this region of the coast.

In the discussion about the protecting from that particular action, there's a – we have berms proposed of 19 foot, 18 feet deep. We don't believe that that is a credible defense against tropical storm surge and we recognize Category 3 starts to approach the threshold of extreme events.

Category 1, 2, tropical storms is [sic] kind of routine and that is an issue because these pits will be vulnerable to wave action in the interior and the exterior.

**Response 67:** The 19-foot berms (referenced to NGVD) would be higher than the 100-year return period storm tide (storm surge added to Mean Higher High Water) and at the limits of a surge resulting from a Category III storm. The hurricane surge limits are shown in Figure 3.3 of the EIS. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. As shown in Figure 3–14, miles of heavily wooded land exists between the proposed berms and the Gulf of Mexico; therefore, wave action on the exterior of these berms would be minimal. The berms themselves would comprise mostly limestone from the site, and therefore would be less prone to erosion from wave action. Interior waves would have to break past the 100-foot-wide work area surrounding mine pits to reach the berms. Each lake would be constructed with a 100-foot-wide work area that is 3 feet above the seasonal high water level. Lake elevation would be held below 16 feet. Wave heights on the largest lake in Alternative 7 for a sustained wind speed of 100 miles per hour (mph) (major hurricane) were calculated to be 3.66 feet. This wave height would result in a wave crest 1.83 feet above seasonal water levels and a resultant total height of 17.8 feet. Extreme rain events could add up to 1 foot to this level but would result in the total water level remaining below the top of the 19-foot bank. In addition, waves would break when the water depth reaches approximately one-half the height of the wave. They would therefore break onto the 100-foot-wide work area before reaching the berm. Section 4.21 has been modified to include additional information on the berms and potential impacts from waves. Additional information on berm integrity has been included in Appendix M, and the wave calculations are included in Appendix N of the final EIS.

**Comment 68:** We also note that there appears to be a little legal conflict between the 19-foot Levy standard and the Levy County code. I realize you're not in the business of enforcing that, but Levy County Code Section 57.19 limits berms to a maximum height of ten feet above grade. It also requires that a berm should have a unrelated surface at or below 10 feet above grade.

**Response 68:** The berm designs and dimensions were included in the applicant's Special Exception Application to Levy County in June 2010, and Levy County has rendered its decision on that application. However, local permitting issues are outside the scope of the EIS.

**Comment 69:** The applicant acknowledges uncertainty on the subject of potential impacts which may result from tropical storm system landfall and attendant surge (Vol2, Appendix 4, Entrix, pg 4). This is based on unknown ramifications of sea water displacing lake pit water in a karst environment, thus becoming a component of ground water movement. Entrix acknowledges the probability of "some impact" but further discussion is not found in the DEIS.

**Response 69:** The impact of seawater introduction into the pits would create a temporary increase in pit water salinity. This phenomenon naturally occurs in estuaries and lakes proximal to the shoreline during large storm events, such as hurricanes. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from major hurricanes (Category III and above) that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years. Should this occur, the potential temporal effect of this infiltration has been shown to be minimal. A discussion on this potential impact has been added to Section 4.2 of the EIS.

**Comment 70:** WAR strongly suggests that tropical storm impacts are a significant risk to this project as probable direct and indirect factors...Introduction of sea water concentrations of chlorides into lake pits and subsequently to ground water resources that at present are not so contaminated.

**Response 70:** The impact of seawater introduction into the pits would create a temporary increase in pit water salinity. This phenomenon naturally occurs in estuaries and lakes proximal to the shoreline during large storm events, such as hurricanes. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from major hurricanes (Category III and above) that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years. Should this occur, the potential temporal effect of this infiltration has been shown to be minimal. A discussion on this potential impact has been added to Section 4.2 of the EIS.

**Comment 71:** Tropical storms may, depending on severity, affect the distribution of petroleum products or other pollutants used in project operations.

**Response 71:** The amounts of hazardous and toxic wastes to be used in the mining process and stored on site are discussed in Section 4.9. Hazardous and toxic wastes stored on site will be protected in advance of land-falling tropical storms and hurricanes to minimize the potential for accidental spills and contamination. Procedures have been developed by the applicant detailing the protection measures to be taken within 2 hours of the issuance of a hurricane warning to protect equipment and the proper storage and security of hazardous materials. Section 4.9.2 of the EIS has been updated to include this information.

**Comment 72:** All Alternatives are vulnerable to tropical storm surge and internal lake pit wave action (DEIS Vol2, Appendix 4, Entrix, Fig 10 Surge Scores). This vulnerability extends to the entire project area incrementally through and inclusive of Category (CAT) 3 tropical storm systems. Only those parts of the proposed Alternative 2 project area in the eastern portion are somewhat protected at present from lower intensity storm surge (TS-CAT2) due to terrain elevation and current sea level elevation. These minimal protections are likely to be much reduced over 110 years as the shoreline moves eastward. The central and western portions of the project area are vulnerable to storms of CAT 2 and lesser intensities. The Entrix figure 10 Surge Scores is considered by this organization to be misleading in that it colors all impact areas under the banner of either TS or CAT 3 intensity. Doing so obscures geographic thresholds of potential impacts from various storm intensity categories. It is appropriate to view the project vulnerability to storm surge in context of intensity by TS Category as portrayed in DEIS Vol. 1, pg 3-6, Fig 3-3.

The applicant seeks a permit for approximately 110 years. It is reasonable to examine the tropical storm period of record for such a lengthy time and make determination of statistical probability for tropical storm impact to the project. Further, it is reasonable to ascertain probability of storm intensity upon landfall in order to evaluate risk. The proposed project life presents uncertainty of impact magnitude, yet the period of record (1851-present) raises statistical probability of tropical storm impact of some magnitude to the level of certainty. WAR finds no significant analysis of this issue in the volumes of the DEIS.

Data relevant to the discussion is [sic] found in the following NOAA web links. WAR acknowledges early data in these summaries do not have the fidelity of post 1950 data due to advancements in observation technology. Possible intensity and track inaccuracies in the early record do not belie the occurrence, or where the impacts were observed. Storm tracks are provided in graphic form for most of the period or record as Attachment B and as tabulated data in Attachment C.

<http://www.nhc.noaa.gov/pastall.shtml>

<http://www.aoml.noaa.gov/hrd/hurdat/ushurrlst.htm>

The period of record indicates in excess of 20 tropical storms of TS-CAT 2 intensity impacted the region. Further, two additional storms of CAT 3 intensity impacted the region during the same period. One of the latter, Hurricane Easy loitered in and around the Gulf Hammock region for a protracted period and deposited nearly 40" of rainfall in 24 hours and a total of over 45" for the event in the vicinity of Yankeetown. <http://www.srh.noaa.gov/images/tbw/paig/PresAmHurricane1950.pdf>

**Response 72:** The USACE recognizes the commentor's concerns over changes in storm protection levels as shorelines potentially shift over the next 110 years. The USACE did not use the referenced Entrix Figure 10 Surge score in its evaluation; Figure 3-3 of the EIS shows individual surge zone categories. The project is designed to withstand storm surge greater than that which would completely inundate the nearby communities of Yankeetown and Inglis, as depicted in Figure 3-3. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years, as discussed in Section 4.2.1.

**Comment 73:** During permitting processes administered by the Bureau of Mining and Mineral Resources (FDEP) the applicant submitted internal wave run up calculations for lake pits in circumstances of sustained wind velocities of 110 mph (Saffir-Simpson CAT 2). Submitted to record by the applicant was a projection of lake pit peak wave heights of slightly less than 7' (Attachment D, 2nd RAI response, November 2009, DEP21, D-pg 10 & 11). Given such vigorous attack on earthen berm structures from

within and noting such projected heights did not include the addition of rain deposition to the height of the water column, WAR finds expectation that such structures might survive intact to be without credibility.

WAR concludes that storms of CAT 3 intensity and greater are a distinct possibility worthy of consideration in development of the EIS. Probability of such impact appears likely but the record does not suggest certainty. However, the probability of direct and indirect impact from storm intensities of TS-CAT2 strength is certain. For such reasons we are of the opinion that detailed examination of risks associated with intensities TS -CAT 3 should be mandatory in this review.

Given that issuance of a permit for this project risks repeated exposure to storm surge throughout the project area by all tropical storm categories it is suggested the applicant provide mine lake wave run up calculation for CAT 3 peak winds as a minimum, to better understand potential risks. Such calculations should include moderate to worst case rainfall totals as additions to projected lake water elevations. The review should likewise provide basis for any expectation that earthen berm structures can withstand tropical storm impacts.

To understand the implications and probability of storm surge it is necessary to examine a great many variables. In addition to the previous reference to NOAA records, it is suggested that review of Attachments E: (Flood Insurance Study-FEMA) and F: (Storm Tides for the Gulf Coast of Florida-NOAA) be undertaken. The variables are complex. The interaction of tide, storm aspect, duration, intensity, land form etc. can, by mere chance, range from benign to disastrous. It is clear that onshore obstructions will modify wave action external to the project berms, but it is equally clear that such assaults cannot be discounted.

Because these issues are either not addressed by the applicant, or addressed in perfunctory fashion, WAR finds no reasonable assurance in assessment of need versus risks to jurisdictional wetlands, associated biological communities and water resources in context of all project alternatives except Alternative 1. No data is [sic] supplied which might project direct or indirect impacts resulting from tropical storms, or which differentiate degrees of impact based on different Category intensities for such events. It is necessary that comprehensive evaluation of all risks attendant to this application be undertaken.

**Response 73:** The 19-foot berms (referenced to NGVD) would be higher than the 100-year return period storm tide (storm surge added to Mean Higher High Water) and at the limits of a surge resulting from a Category III storm. As shown in Figure 3–14, miles of heavily wooded land exists between the proposed berms and the Gulf of Mexico; therefore, wave action on the exterior of these berms would be minimal. The berms themselves would comprise mostly limestone from the site, and therefore would be less prone to erosion from wave action. Interior waves would have to break past the 100-foot-wide work area surrounding mine pits to reach the berms. Each lake would be constructed with that 100-foot-wide work area 3 feet above the seasonal high water level. Lake elevation would be held below 16 feet. Wave heights on the largest lake in Alternative 7 for a sustained wind speed of 100 mph (major hurricane) were calculated to be 3.66 feet. This wave height would result in a wave crest 1.83 feet above seasonal water levels and a resultant total height of 17.8 feet. Extreme rain events could add up to 1 foot to this level but would result in the total water level remaining below the top of the 19-foot bank. In addition, waves would break when the water depth reaches approximately one-half the height of the wave. They would therefore break onto the 100-foot-wide work area before reaching the berm. Section 4.21 has been modified to include additional information on the berms and potential impacts from waves. Additional information on berm integrity has been included in Appendix M, and the wave calculations are included in Appendix N of the final EIS. The project is designed to withstand storm surge greater than that which would completely inundate the nearby communities of Yankeetown and Inglis. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years.

**Comment 74:** No data is [sic] provided upon which to support the thesis that earthen berms might survive intact through TS-CAT 2 tropical storm events. Given the failure of robust levee structures in New Orleans during the landfall of Hurricane Katrina and that those structures were intended to protect against the specific intensity present in that storm, there is absolutely no reason to expect earthen structures to prevail in such circumstances. The design criterion for such structures around mine lake pits is the 100

year storm event, not tropical storm impacts. Tropical storm events in this region are not a statistical risk, they are a certainty. In order that a permit for this project be properly founded it is necessary that known risks be fully evaluated.

The legal authority of the applicant to construct berms to 19' NGVD elevation in the western portions of Alternative 2 is clouded by Levy County Code (Attachment A), thus rendering storm protection by berms problematic.

**Response 74:** The 19-foot berms (referenced to NGVD) would be higher than the 100-year return period storm tide (storm surge added to Mean Higher High Water) and at the limits of a surge resulting from a Category III storm. Miles of heavily wooded land exists between the proposed berms and the Gulf of Mexico; therefore, wave action on the exterior of these berms would be minimal. The berms themselves would comprise mostly limestone from the site, and therefore would be less prone to erosion from wave action. Interior waves would have to break past the 100-foot-wide work area surrounding mine pits to reach the berms. Each lake would be constructed with that 100-foot-wide work area 3 feet above the seasonal high water level. Lake elevation would be held below 16 feet. Wave heights on the largest lake in Alternative 7 for a sustained wind speed of 100 mph (major hurricane) were calculated to be 3.66 feet. This wave height would result in a wave crest 1.83 feet above seasonal water levels and a resultant total height of 17.8 feet. Extreme rain events could add up to 1 foot to this level but would result in the total water level remaining below the top of the 19-foot bank. In addition, waves would break when the water depth reaches approximately one-half the height of the wave. They would therefore break onto the 100-foot-wide work area before reaching the berm. Section 4.21 has been modified to include additional information on the berms and potential impacts from waves. Additional information on berm integrity has been included in Appendix M, and the wave calculations are included in Appendix N of the final EIS. The berm designs and dimensions were included in the applicant's Special Exception Application to Levy County in June 2010, and Levy County has rendered its decision on that application. However, local permitting issues are outside the scope of the EIS.

**Comment 75:** Expert testimony has also been entered into the record that a predictable storm surge within 13 years will breach the proposed berms. Whether your interest is agricultural, residential, or just water, this could affect everyone. Salt intrusion will affect all of these interests.

**Response 75:** The 19-foot berms (referenced to NGVD) would actually be higher than the 100-year return period storm tide (storm surge added to Mean Higher High Water) and at the limits of a surge resulting from a Category III storm. The project is designed to withstand storm surge greater than that which would completely inundate the nearby communities of Yankeetown and Inglis. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years.

**Comment 76:** Berms – the proposed height of the berms is 14 to 18 feet, not adequate for a Category 3 storm surge or above. The impacts of overtopping of the berms could be significant. These potential impacts must be fully considered in the final EIS.

**Response 76:** The 19-foot berms (referenced to NGVD) would actually be at the limits of a surge resulting from a Category III storm. The project is designed to withstand storm surge greater than that which would completely inundate the nearby communities of Yankeetown and Inglis. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years, as discussed in Section 4.2.1. The impact of seawater introduction into the pits would create a temporary increase in pit water salinity. This phenomenon naturally occurs in estuaries and lakes proximal to the shoreline during large storm events, such as hurricanes. Should this occur, the potential temporal effect of this infiltration has been shown to be minimal.

**Comment 77:** It is likely a large storm will occur some time during the 100 years of the mine's existence, making salt-water intrusion from such a storm a distinct probability. Flooding from this type of storm surge could breach the mine's berm and introduce salt water into the aquifer. Salt-water intrusion is already a

problem in wells in Cedar Key, Levy County (Mark Scohier and Lou Elliott Jones, Cedar Key Wells Suffer Salt Water Intrusion, Citrus County Chronicle, June 21, 2012).

**Response 77:** The 19-foot berms (referenced to NGVD) would actually be higher than the 100-year return period storm tide (storm surge added to Mean Higher High Water) and at the limits of a surge resulting from a Category III storm. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years. The impact of seawater introduction into the pits would create a temporary increase in pit water salinity. This phenomenon naturally occurs in estuaries and lakes proximal to the shoreline during large storm events, such as hurricanes. Should this occur, the potential temporal effect of this infiltration has been shown to be minimal.

**Comment 78:** Flooding: Based on the location of this project, both the mining and mitigation sites would be susceptible to flooding from hurricane storm surge and sea level rise. In a tropical storm, the entire mitigation site would be flooded. In a Category 1-2 storm, the western half of the mining site would be flooded, and the entire mining site would be flooded from a Category 3-5 storm. As tropical storms are not uncommon and climate models predict more frequent severe storm events in the future, the mitigation site could be flooded much more easily and often than the mining site. If this occurred, the damage to the wetlands incurred through mining activities would not be adequately mitigated for and the ecological value of the mitigation would decrease.

**Response 78:** The 19-foot berms (referenced to NGVD) would actually be at the limits of a surge resulting from a Category III storm. The project is designed to withstand storm surge greater than that which would completely inundate the nearby communities of Yankeetown and Inglis. The natural occurrence of tropical disturbances creating storm surge into coastal wetlands is not a detrimental impact, nor would it decrease the ecological value of the mitigation parcel. The species that populate these coastal areas are adapted to natural disturbances such as these. As intervals increase between large storm events, larger numbers of species less tolerant of saline inundation may recruit into these areas. These species might then be replaced by the appropriate species; however, this succession would not be an unnatural or detrimental change.

**Comment 79:** Category 1 and 2 tropical storms occur regularly in Florida, and it is only common sense that Category 3 and higher storms should be considered in development of the EIS for any location in Florida or the Gulf Coast. It would be nonsensical to argue that because a Category 4 or 5 storm has not impacted this area yet that it will not occur in the next 110 years! A detailed analysis of the potential impact associated with ALL intensities of Tropical Storms Category 2-5 should be required, including moderate and worst case rainfall and all scenarios for sea-level rise over the requested project period.

**Response 79:** All storm categories were considered in the EIS; hurricane surge limits by individual category are depicted in Figure 3–3. The USACE recognizes the commentor’s concern over the difficulties in predicting storm landfalls over the next 110 years. Analysis of scenarios as altered by sea-level rise is discussed for each alternative in Section 4.2.1 of the EIS. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years.

**Comment 80:** The review should provide detailed engineering analysis of the earthen berms to show whether they withstand Category 2, 3, 4 and 5 tropical storm impacts. In New Orleans, the storm breached the berms and we need to be certain that will not happen here.

**Response 80:** The 19-foot berms (referenced to NGVD) would be higher than the 100-year return period storm tide (storm surge added to Mean Higher High Water) and at the limits of a surge resulting from a Category III storm. Miles of heavily wooded land exists between the proposed berms and the Gulf of Mexico; therefore, wave action on the exterior of these berms would be minimal. The berms themselves would comprise mostly limestone from the site, and therefore would be less prone to erosion from wave action. The berms would not impound water over long periods of time, or act as levees to continuously maintain a river in its banks. The berms would only serve as “dikes” in the unlikely event of floodwaters

briefly reaching this distance inland, as described in Section 3.9. Therefore, engineering analysis of this type of structure is unnecessary. Interior waves would have to break past the 100-foot-wide work area surrounding mine pits to reach the berms. Each lake would be constructed with a 100-foot-wide work area that is 3 feet above the seasonal high water level. Lake elevation would be held below 16 feet. Wave heights on the largest lake in Alternative 7 for a sustained wind speed of 100 mph (major hurricane) were calculated to be 3.66 feet. This wave height would result in a wave crest 1.83 feet above seasonal water levels and a resultant total height of 17.8 feet. Extreme rain events could add up to 1 foot to this level but would result in the total water level remaining below the top of the 19-foot bank. In addition, waves would break when the water depth reaches approximately one-half the height of the wave. They would therefore break onto the 100-foot-wide work area before reaching the berm. Section 4.21 has been modified to include additional information on the berms and potential impacts from waves. Additional information on berm integrity has been included in Appendix M, and the wave calculations are included in Appendix N of the final EIS.

**Comment 81:** WAR is not aware of any significant investigation or testimony by the applicant regarding tropical storm impacts or sea level rise. We cannot support alternatives which are at risk without reasonable expectation that predictable events will not overwhelm inappropriate or inapplicable design criteria.

**Response 81:** All storm categories were considered in the EIS; hurricane surge limits by individual category are depicted in Figure 3–3. The USACE recognizes the commentor’s concern over the difficulties in predicting storm landfalls over the next 110 years. Analysis of scenarios as altered by sea-level rise is discussed for each alternative in Section 4.2.1 of the EIS. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years.

**Comment 82:** WAR finds the applicant’s examination of risks deficient due to lack of thorough examination of tropical storm impacts, disregard of impacts associated with sea level rise or cumulative impacts resulting from the combination thereof.

**Response 82:** All storm categories were considered in the EIS; hurricane surge limits by individual category are depicted in Figure 3–3. The USACE recognizes the commentor’s concern over the difficulties in predicting storm landfalls over the next 110 years. Analysis of scenarios as altered by sea-level rise is discussed for each alternative in Section 4.2.1 of the EIS. Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is less than 2 percent over the next 50 years.

## **I.6 SEA-LEVEL RISE**

**Comment 83:** The DEIS suggests a range of zero to 5.7 feet. It further suggests that will cause inundation of the western part of the project area.

**Response 83:** Yes. Sea-level rise is discussed in Section 4.2.1 of the EIS.

**Comment 84:** Examination of Sea Level Rise (SLR) by the Corps presents findings which posit [sic] substantial uncertainty due to proposed project life. The range of possible change presented in the DEIS is 0-5.7’. Factors which promote SLR include global warming and geological subsidence. In the region of Gulf Hammock we are fortunate to have expert review of local trends and resulting impacts. Various works (Attachment G, Castaneda and Putz) have evaluated the phenomena in and around Waccasassa Bay State Park and observed recent acceleration of the trend. Current SLR rates are in the range of 2mm - 2.2mm/year. It appears unlikely that increasing SLR trends will abate in the near term and WAR finds the DEIS upper projection of potential SLR to be conservative though credible for purposes of this review.

Additional discussion on SLR is found in the recently released “Historic Topographic Sheets to Satellite Imagery: A Methodology for Evaluating Coastal Change in Florida’s Big Bend Tidal Marsh”, Raabe, Streck, and Stumpf for USGS; June 2012

Access to the document is found here: <http://pubs.usgs.gov/of/2002/of02-211/> and it will be provided by WAR upon request. File data for this document is [sic] large due to enclosed graphics.

Analysis by the Corps indicates the southwestern portion of the Alternative 2 project area and a very large portion of the mitigation parcel will be inundated prior to project completion. Such occurrence suggests profound uncertainty over the life span of the project in context of assumptions or conclusions developed by the applicant on topics of ground and surface hydrology, berm structure integrity, and tropical storm impact (direct and indirect).

Due to uncertainty attendant to this issue over the proposed term of the project, WAR finds no basis to support any project alternative which will be significantly influenced, directly or indirectly by SLR. WAR concludes that areas of the project alternatives at risk of impact from storm surge only in circumstance of CAT 3 storms, will be equally at risk from lesser intensity storms before the project life is complete. The applicant's [sic] intends to leave approximately 1,400 acres of open lake pits in the project area (Alternative 2). These lake pits are for the most part vulnerable to storm intensities of TS - CAT 2 in present day circumstances and present greatest footprint in the western portion of Alternative 2. Risks based on scope of the project and magnitude of impact will increase with the passage of time. The risks will exist in perpetuity.

**Response 84:** The USACE understands the commentor's concerns regarding the uncertainty of sea-level rise predictions for mining periods up to 110 years, as proposed in Alternative 2. The USACE appreciates the information provided by the commentor. The information provided in the EIS was based on the most recent data available, and Sections 3.6.2 and 4.2.1 of the EIS have been updated to reflect use of the 2011 version of USACE Circular EC-1165-2-212. The USACE will use this updated information when evaluating all of the alternatives prior to issuing a ROD.

**Comment 85:** Sea Level Rise - The DEIS projects a sea level rise of 0-5.7 feet over the life of the project. This (minimal) projection would cause inundation at the western part of the project. The potential impacts of inundation must be fully considered.

**Response 85:** The USACE will evaluate all of the impacts, including sea-level rise, when evaluating the proposed alternatives. Sections 3.6.2 and 4.2.1 have been updated in the EIS to include the latest information available regarding sea-level change.

**Comment 86:** In addition to discrete storm events that will create surges of water into the system, predicted levels of sea level rise stand to cause sustained increases in water levels that will run the risk of flooding the mining site for several alternative actions. As with the storm surge, the mitigation site would also be flooded more quickly by sea level rise than any portion of the mining site, again reducing or eliminating any conservation benefits observed as a result of mitigation.

**Response 86:** The commentor's concern over flooding impacts on several of the alternatives is noted, and is described for each onsite action alternative in Section 4.2 of the EIS. Probabilities of storm surge impacting both the mine and mitigation sites have been added to Section 3.9. Information regarding the potential for impacts on the mitigation site has been added to Section 5.4.2 of the EIS.

**Comment 87:** Rising sea level will cause much of the "mitigation" area to be inundated and become submerged lands over 110 years. There is no "mitigation" from submerged marshes. The applicant must be required to provide "mitigation areas" selected such that they are no more likely to flood than the areas they are "mitigating."

**Response 87:** Information regarding the potential for impacts on the mitigation site has been added to Section 5.4.2 of the EIS. As discussed in Section 5.1, any USACE permit, if issued for one of the action alternatives in the EIS, would include a mitigation plan that adheres to the requirements of Title 33 of the *Code of Federal Regulations* (CFR) Part 332 – *Compensatory Mitigation for Losses of Aquatic Resources*. These requirements include financial assurances; a stated preference for in-kind over out-of-kind mitigation; and a need for adaptive management that anticipates the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance.

**Comment 88:** Tropical storm impacts will increase as Sea Level rises. All storm impact risks should be recalculated to show tropical Storm risks under worst case Sea Level rise over the full project life.

**Response 88:** Tropical storm and wind speed probabilities have been added to Section 3.9 of the EIS. The probability of storm surge from Category III and above major hurricanes that could potentially cause saline waters to enter the mine pits is independent of the projected sea-level rise and is calculated to be less than 2 percent over the next 50 years.

## I.7 GROUNDWATER

**Comment 89:** We MUST NOT permit Tarmac to drill a rock mine under Special Exception, as they are not zoned for this. Even their permitted consumptive use WILL draw too much from the quifer - let alone their anticipated 22 mil.gal.water/day to wash their rock for 100 years. Their first mine pit is at the headwaters of Bone Slough which will stop ALL water from flowing across Levy County.

**Response 89:** The USACE recognizes the commentor's opposition to the proposed mine. The applicant is authorized by its General Water Use Permit No. 20013273.000, issued by the Southwest Florida Water Management District (SWFWMD), to withdraw and consume up to 136,800 gallons per day from groundwater. The permit allows the applicant to use up to 13 million gallons of water per day for crushing, screening, and washing rock, with most of the water pumped from the mine pits to the processing plant pond and re-pumped back to the mine pits, i.e., recycling. Surface water flow across Levy County would not be impeded, as activities in and around the flow-ways and intermittent streams found on the site would be limited to a few culverted crossings. Surface water impacts are discussed in Section 4.2.1.

**Comment 90:** I'm for, you know, save us, save our lives, save our health and deny this. I just really -- I cannot believe it. That we could do what we did to our lower river with the barge canal and now we're going to turn around and kill our wells.

**Response 90:** The USACE recognizes the commentor's opposition to the proposed mine. The commentor's reference to the barge canal decision is not related to this project and is outside of the scope of the EIS. Impacts on local wells have been evaluated in Section 4.2.2 and were determined, on average, to be less than a 0.3-foot drawdown.

**Comment 91:** Right now Florida is in the middle of an epic drought and the Suwannee River Management is issuing million gallon a day permits to everyone that requests them. It makes no sense to blow up the aquifer three times a week for the next 115 years as you're proposing.

**Response 91:** The impact on groundwater is evaluated in Section 4.2.2. The applicant is authorized by its General Water Use Permit No. 20013273.000, issued by the SWFWMD, to withdraw and consume up to 136,800 gallons per day from groundwater. The analyses in Section 4.2.2 show that the project, as proposed by the applicant, would result on average to be less than a 0.3-foot drawdown of groundwater levels.

**Comment 92:** Once mining is completed, the applicant would turn the land over to the citizens of Florida. Thus, all costs related to maintaining berms, water quality, and management of these new state lands would not be required if sourcing the aggregate from outside the state would be the alternative means.

If this were the approach to take, we would eliminate the potential of drawdown and contamination of our aquifer.

**Response 92:** Thank you for your comment. The applicant proposes to only lease the mining areas; the landowner would retain ownership over mined areas. The leasing agreement is described in Appendix G of the EIS. Shipping aggregate into the region from outside of Florida is discussed in Section 2.2.1 and was not considered to be a more reasonable alternative. The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal.

**Comment 93:** And then finally, the impacts, water impact. The water impacts. Obviously, listening to everybody it's come to me that how does the Corps work in understanding what else is going on in the

area in a 70-mile radius perhaps as to what permits are being issued by our water management districts and what cumulative effect that may have? There's much talk, the citizens talk about it, somebody handed me a note about one of our county's parks being closed due to saltwater intrusion which I guess is probably 15 miles inland. I would suggest maybe you contact Levy County Board of County Commissioners to find out if, in fact, there is an issue in Blue Springs Park because that's quite a ways inland. I live on the river here in Yankeetown. Just the first time in eight years, I irrigate from the river, I lost about 20 percent of my plants that are not able to survive saltwater intrusion.

**Response 93:** Thank you for your comment. The reasons for and impacts of potential saltwater intrusion in county parks 15 miles inland is outside the scope of the EIS. However, with regard to the impacts from the proposed Tarmac King Road Limestone Mine site, the potential for saltwater intrusion impacts was analyzed and determined to be minimal, as discussed in Section 4.3.2.2. Cumulative impacts are discussed in Section 4.17.

**Comment 94:** I am very much against this project primarily because of the lack of guarantees that are given to the folks that are impacted on this. I haven't seen or heard any kind of guarantees from Tarmac or any of their affiliates that we can guarantee there to be no saltwater intrusion in our wells or a guarantee that your well will not go dry or that the excavation of the lime rock and the water will not cause sinkholes of not only the nearby properties, but properties in any ten mile area because who knows how far those go.

**Response 94:** The potential for impacts on saltwater intrusion from mining was analyzed and determined to be minimal, as discussed in Section 4.3.2.2. The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal. To verify these impacts would be minimal, groundwater level monitoring would be made a part of any permit, if issued, as discussed in Section 4.2.2.6.

**Comment 95:** Their first mine pit is planned at the headwaters of Bone Slough and affects Spring Run where it joins just west of the site and will prevent any water from flowing across Levy County into the Gulf.

SWIFTMUD states the area south of the hydrologic divide, and I have a graph in here from SWIFTMUD, is fed only by rainfall and it's not raining. Tarmac water consumption is permitted at a low-gallon rate, but their rock-washing aquifer use is 22 million gallons of water a day.

There are about 30 public water supplies, including Inglis and Yankeetown, drawing from that part of the aquifer, as well as many private wells. Progress Energy states great water withdrawal will be needed for the nuclear -- Levy nuclear plants.

The large Ogallala [sic] Aquifer due to over-pumping requires water to be trucked into many areas, covered eight states, and because they were raising corn and irrigating it to make ethanol, they used up all their water. No reason to open Levy County up to such disaster.

**Response 95:** With the exception of culverted road crossings, streams and flow-ways are avoided in all of the action alternatives. Alternatives 4 and 7 were proposed in part to reduce the mining footprint in the northeast corner of the mining site as an additional buffer from Spring Run and the higher-quality wetlands there, including its floodplain. The groundwater modeling performed for the bounding alternatives (2, 3, 7, and 8) included analyses for wet, average, and dry years to simulate the impacts during years with varying rainfall amounts. The results are provided in Section 4.2.2 and Appendix D of the EIS. Note that the applicant is authorized by its General Water Use Permit No. 20013273.000, issued by the SWFWMD, to withdraw and consume up to 136,800 gallons per day from groundwater. The permit allows the applicant to use up to 13 million gallons of water per day for crushing, screening, and washing rock, with most of the water pumped from the mine pits to the processing plant pond and re-pumped back to the mine pits, i.e., recycling. No appreciable cumulative impact on groundwater levels from the proposed mine site in conjunction with the proposed LNP is expected, as discussed in Section 4.17.

**Comment 96:** Note: Digging as deeply as Tarmac plans to go, they will hit highly mineralized water and then saltwater below the freshwater lens.

**Response 96:** The potential for saltwater intrusion was analyzed and determined to not be impacted by mining, as discussed in Section 4.3.2.2. The applicant proposes to mine to a maximum depth of 120 feet, and the saltwater interface as determined by drilling was below 380 feet. The impacts involving minerals present in groundwater at the site are described in Section 4.3.2.

**Comment 97:** Since we spoke at Cedar Key, Florida has had saltwater entering their drinking water.

**Response 97:** Thank you for your comment. The potential for saltwater intrusion was analyzed and determined to not be impacted by mining, as discussed in Section 4.3.2.2.

**Comment 98:** Besides that, the next major issue which I also conveyed to the applicant is for me the impact on the groundwater of lakes. We are dealing with the Southwest Water Management District, which I'm sorry to say, that does not have the most wonderful reputation for protecting water.

**Response 98:** Thank you for your comment. The impact on groundwater is addressed in Section 4.2.

**Comment 99:** If we get sinkholes due to excessive wastewater, that may cause soil [sic] water intrusion. And then the proximity to the proposed nuclear power plant is most unfortunate.

**Response 99:** Sinkholes can form when groundwater is removed and the cavity underneath gives way. As discussed in Section 4.2.2 of the EIS, the impact on the water level in offsite wells is minimal. The potential for saltwater intrusion was analyzed and determined to be minimal, as discussed in Section 4.3.2.2. The applicant proposes to mine to a maximum depth of 120 feet and the saltwater interface as determined by drilling was below 380 feet. The cumulative impact of the proposed mine site in conjunction with the proposed LNP is discussed in Section 4.17.

**Comment 100:** I have photographed numerous times what has happened with the drought, with all of the creeks that used to flow, the springs that used to flow under Buckhead Road, they're all dry. And last year about every six months and about four weeks ago I jumped down into every creek, every culvert that flowed under Buckhead Road and made pictures through the culverts, there's not any water to even be in there. It's just the amount of water that not only from the use of the water for the mines, but the evaporation process from the lakes.

You're taking water two different ways, not just from their water usage, but evaporation of those waters. And when you're talking about now putting an application for a sand mine right across the highway from there, that's going to use water. Then you go over further and you put a power plant in there, that's more water. So you're talking about, you know, turning the Nature Coast into the Cove Coast. We're going to have no water.

And there's [sic] been wells already – I'm a person who has been in the postal service here forever, so people call me with all kinds of complaints. I've been up and talked to people whose private wells have already gone dry. Some of the camps out on the Gulf say the springs don't flow out there anymore. The saltwater intrusion used to be at the bottom of Baldwin Lodge. Now it's beyond the Highway 19 bridge. So we have water problems we're going to have to face otherwise rather than having all of our water pumped out.

**Response 100:** The groundwater modeling performed for the bounding alternatives (2, 3, 7, and 8) included analyses for wet, average, and dry years to simulate these possibilities. The results are provided in Section 4.2.2 and Appendix D of the EIS. Also, as discussed in Section 3.9.1.2, average annual precipitation exceeds evaporation by over 6 inches even over open water in Levy County. The impact of evaporation on lakes and groundwater on the site would be minimal, even in dry years. The cumulative impacts from the proposed sand mine and LNP are discussed in Section 4.17 of the EIS.

**Comment 101:** It risks the water supply and safety and quality of water to every person in the nine – in the nine county – at least the nine county area.

**Response 101:** The impacts of the proposed mine on the local hydrology and water quality for all alternatives are discussed in Sections 4.2 and 4.3 of the EIS, respectively. The impacts were determined to be minimal.

**Comment 102:** It has been noted on previous testimony in front of the county commissioners that going through with this project would expose the county and others to \$95 billion worth of liability because of the effect and the amount of water and the quality of water.

**Response 102:** The impacts of the proposed mine on the local hydrology and water quality for all alternatives is discussed in Sections 4.2 and 4.3 of the EIS, respectively. The impacts were determined to be minimal.

**Comment 103:** The second question was when SAIC, did the groundwater modeling, I was wondering if they had taken more measurements on the groundwater flow or whether it was all based on the original set of test wells and things like that that were done?

**Response 103:** The groundwater modeling was performed using the information on all of the onsite and offsite wells available and the soil properties.

**Comment 104:** I've become fairly familiar and fairly skeptical of groundwater models.

**Response 104:** Thank you for your comment. The methodology used in performing the groundwater modeling is provided in Appendix D.

**Comment 105:** If I'm doing the math correctly, on this particular project from what you just told us that it's going to be 120 feet deep in the deepest pit, that would put it over 100 feet below sea level. Is that your understanding of it? I didn't see anything about 12 feet above sea level on the surface. So I guess I would be very skeptical of any groundwater model that says that there's not going to be damage as a result of mining a hundred feet below sea level.

**Response 105:** Yes, as described in Section 4.7, the applicant proposes to mine to a depth of 120 feet. The groundwater analyses presented in Section 4.2 and Appendix D of the EIS are based on this depth.

**Comment 106:** I would be very cautious about the accuracy of your model. We've talked to PHD modelers who are very unimpressed with the kind of modeling that SWIFTMUD's doing and all I can say is there's far more that's unknown about our karstography [sic] than what is known and if anybody tells you different is lying to your face.

**Response 106:** Thank you for your comment. The modeling for this site is explained in Appendix D, and the impacts for each alternative are described in Section 4.2.2.

**Comment 107:** Also, the other thing regarding the water seepage, you said a .3-foot average drawdown. Is that correct?

**Response 107:** That is correct. The average drawdown can be found in Section 4.2.2.

**Comment 108:** So saltwater [sic] intrusion is a very big deal and this project certainly appears to have a problem with that.

**Response 108:** The potential for saltwater intrusion from the proposed mining was analyzed and determined to be minimal, as discussed in Section 4.3.2.2.

**Comment 109:** Address the potential contamination of the aquifer. The mine is proposed to be 120 feet at its deepest point, over 100 feet below sea level. It's unlikely there would be no damage to ground water as a result. Karst model accuracy and adequacy must be seriously questioned.

**Response 109:** The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal. The potential for saltwater intrusion from mining was analyzed and determined to be minimal, as discussed in Section 4.3.2.2. The methodology and description of the groundwater model are provided in Appendix D.

**Comment 110:** I just have two comments to make and one is to reinforce the whole water discussion here tonight. It is ludicrous to me how we could be sitting here considering anything that would affect water usage in this area. It is just ludicrous. There's so much literature about talking about the fact that there is no water and there will be less water.

**Response 110:** Thank you for your comment. The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal.

**Comment 111:** But to me, water is really the crux of this whole thing. I mean, it's the bottom line. I don't - you can talk about everything else depends on the water. I don't care if you talk about the animals. If the water is not here, the animals are not here. So the water is the bottom line, the most common denominator.

**Response 111:** The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal. Due to the conversion of forested land to lakes during and at the completion of mining, the amount of surface water available for animals, particularly water fowl, would be increased by the proposed mining project.

**Comment 112:** The effect of this upon the groundwater in Levy County concerns me the most.

**Response 112:** Thank you for your comment. The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal.

**Comment 113:** This area, as with many parts of Florida, is having serious water shortage issues, and they will only get worse! Lower stream, lake, and sub-surface water levels are already a problem, and projected to get worse. We cannot afford the Tarmac mine, in terms of water usage. Please use your influence to stop this demise of west Florida.

**Response 113:** The USACE understands the commentor's concern related to water usage. The applicant is authorized by its General Water Use Permit No. 20013273.000, issued by the SWFWMD, to withdraw and consume up to 136,800 gallons per day from groundwater. Groundwater modeling shows this withdrawal in combination with lake evaporation from mine pits would have minimal impact, lowering the groundwater table in adjacent wells an average of 0.3 feet, as described in Section 4.2.2.

**Comment 114:** Sinkholes can form as a result of vibration and withdrawal of large amounts of water from the aquifer. The Florida 'Nature Coast' is already prone to sinkholes and a mine of this magnitude will further exacerbate this danger. Our aquifer is already stressed and impaired from over-pumping, pollution and drought, and this mine will draw it down an additional 22 million gallons of water a day.

**Response 114:** The applicant is authorized by its General Water Use Permit No. 20013273.000, issued by the SWFWMD, to withdraw and consume up to 136,800 gallons per day from groundwater. The permit allows the applicant to use up to 13 million gallons of water per day for crushing, screening, and washing rock, with most of the water pumped from the mine pits to the processing plant pond and re-pumped back to the mine pits, i.e., recycling. The groundwater models included water loss through lake evaporation and pumping for mining processes, as described in Appendix D of the EIS. Modeling indicates impacts from groundwater drawdown at the proposed Tarmac King Road Limestone Mine (see Section 4.2.2) are expected to be minimal. The largest change in average local groundwater tables would be  $\pm 0.3$  feet, and this impact would extend only relatively short distances from the project site, as depicted in Figures 4-4 and 4-5. This minimal alteration is not expected to cause sinkholes to form.

**Comment 115:** Groundwater quality: The impacts to groundwater quality would originate from various operations of the mine, such as blasting, rock removal, and refilling of excavated quarries. Such activities may, as referenced on p. 17 of the EIS, increase fine sediment concentration, alter the geochemistry of the aquifer, and increase the risk of spills. These events would affect waters not only within the project site, but also offsite since affected waters travel downstream. In addition, the EIS states that the level of impact the project may have on groundwater quality would be independent of which alternative was chosen, suggesting that it is the entire operation of the mine itself that needs to be reviewed, rather than the different alternatives. While the EIS states that potential impacts could be monitored and mitigated,

we feel that the mine activities present too great a risk to groundwater quality and should not be permitted.

**Response 115:** Thank you for your comment. The USACE recognizes the commentor's opposition to mining. The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal. The commentor points out and literature reviews indicate blasting operations can induce fracturing in the rock matrix surrounding the area blasted and/or excavated. These actions may increase the hydraulic conductivities ( $K_v$  and  $K_h$ ) of the rock matrix. Studies indicate the linear or vertical extents of these fractures are not expected to be of any significant lengths. A potential impact of higher rock matrix conductivity surrounding the quarry pits would be increased groundwater flow, which would be limited to within the extended area (i.e., the surrounding the quarry pit area with induced fractures from blasting operations) of the mining pits. Therefore, the overall impacts would be minimal. Previously, it was observed from the backfill material  $K$  sensitivity analysis (see Appendix D, Table D-17) that increasing the backfill material hydraulic conductivity by a couple orders of magnitude did not change the head differences from baseline by any significant amount, thus justifying the above conclusion that the overall impacts would be minimal. A discussion on rock fracturing impacts has been added to Section 4.7.3 of the EIS. Finally, the impacts of the proposed mine on the local hydrology and water quality for all alternatives are discussed in Sections 4.2 and 4.3 of the EIS, respectively. The impacts were determined to be minimal.

**Comment 116:** A major oversight in the DEIS is it that does not employ the most appropriate geochemical water model for assessing potentially significant water quality changes that I expect to occur in the immediate vicinity of active mining less within a year following start-up of "deep," high-volume rates of extraction and aggregate processing on the proposed property. The entire upper Floridian [sic] aquifer above Middle Confining Unit which occurs about 500' below the top of saturated zone marking the top of the upper Floridian [sic]. I suspect only about 80-100 ft of potable ground water exists over most of the mine lease.

**Response 116:** Significant water quality changes would not be expected to occur in the immediate vicinity of active mining due to extractions from the deep groundwater zone. Potable groundwater extends to a depth greater than 400 feet over most of the mine lease area. As indicated in Section 3.2.1 of the EIS, the chloride concentration in the site groundwater at a depth of 370 feet is 50 milligrams per liter, and monitoring wells screened between 278 and 306 feet below ground surface had chloride concentrations between 11 and 32 milligrams per liter (i.e., much below the maximum contaminant level of 250 milligrams per liter). Therefore, it is expected that the saltwater interface at the mining site is likely much below the depth of 400 feet. As a result, groundwater extraction above this depth would not be expected to cause any saltwater intrusion or significant water quality changes.

**Comment 117:** Blasting operations induce fractures in the surrounding rocks, significantly altering hydraulic conductivity ( $K$ ) values. In general, blasting alters  $K$  values in surrounding formations that enhance groundwater flow potential in an extended area surrounding the quarry pit. Blasting also results in induced fractures in the quarry bottom that can extend tens of feet below the base of excavation. This enhances potential for vertical fluid movement because [of] significant increases in  $K_v$ .

**Response 117:** The commentor points out and literature reviews referenced in Section 4.7.3 indicate that blasting operations can induce fracturing in the rock matrix surrounding the area blasted and/or excavated. These actions may increase the hydraulic conductivities ( $K_v$  and  $K_h$ ) of the rock matrix. Studies referenced in Section 4.7.3 indicate the linear or vertical extents of these fractures are not expected to be of any significant lengths. A potential impact of higher rock matrix conductivity surrounding the quarry pits would be increased groundwater flow, which would be limited to within the extended area (i.e., the surrounding the quarry pit area with induced fractures from blasting operations) of the mining pits. Therefore, the overall impacts would be minimal. Previously, it was observed from the backfill material  $K$  sensitivity analysis (see Appendix D, Table D-17) that increasing the backfill material hydraulic conductivity by a couple orders of magnitude did not change the head differences from baseline by any significant amount, thus justifying the above conclusion that the overall impacts would be minimal. A discussion on rock fracturing impacts has been added to Section 4.7.3 of the EIS.

**Comment 118:** At present there is no significant chloride contamination in ground water within or without [sic] the project area, however wells in Cedar Key have just in the last few days experienced sudden unexpected, unexplained, and catastrophic chloride contamination rendering them unfit for use.

**Response 118:** Thank you for your comment. Chloride contamination is discussed in Section 3.2. The chloride concentration in the site groundwater at a depth of 370 feet is 50 milligrams per liter, and monitoring wells screened between 278 and 306 feet below ground surface had chloride concentrations between 11 and 32 milligrams per liter (i.e., much below the maximum contaminant level of 250 milligrams per liter). Therefore, it is expected that the saltwater interface at the mining site is likely much below the depth of 400 feet. As a result, groundwater extraction above this depth would not be expected to cause any saltwater intrusion or significant water quality changes. Cedar Key is located outside of the impact area evaluated in the cumulative effects portion of the final EIS, found in Section 4.17.

**Comment 119:** Tarmac proposes a 120 foot deep mine that will cover 2400 acres only five miles away. Any assurance that this will not affect our water supply in the next 100 years is not to be believed.

**Response 119:** Thank you for your comment. The impacts associated with mining to this depth in this location are evaluated in Section 4.2. The conclusion of this evaluation was that water levels in nearby wells would decrease on average about 0.3 feet for the maximum mine-out (Alternative 2).

## I.8 WETLANDS

**Comment 120:** Eliminate the need for wetland mitigation which is an interesting term since it does not mean wetlands will be increased, but only that wetlands will be -- other wetlands will be preserved to make up for the lost of these wetlands exposed to mining impacts.

Rebuilding wetlands is not a proven science since many wetlands renewals have not succeeded in creating a healthy new wetland.

**Response 120:** After extensive fieldwork on the site, the USACE performed its own functional assessment of the wetlands proposed for impact and those proposed to be used for mitigation. This assessment is presented in Section 4.4.2. Using the Uniform Mitigation Assessment Method (UMAM), it determined that increases in wetland functions would occur through elimination of ongoing timbering activities, perpetual preservation, and enhancement and restoration. Wetland creation is not proposed as a component of the applicant's mitigation plan. As discussed in Section 5.1, any USACE permit, if issued for one of the action alternatives in the EIS, would include a mitigation plan that adheres to the requirements of 33 CFR Part 332 – *Compensatory Mitigation for Losses of Aquatic Resources*. These requirements include financial assurances; a stated preference for in-kind over out-of-kind mitigation; and a need for adaptive management that anticipates the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. Any USACE permit, if issued, would also include special conditions with detailed timeframes and success criteria for the mitigation activities.

**Comment 121:** The UMAAM [sic] scores mentioned when you carefully study the applicant's submission to that of the state, the applicant scores the area to be affected by mining lower than many of the FDEP studies. In the state's report, several times it is mentioned that this area is – of the proposed mine, there are many – there are some of the most pristine wetlands in the nation, if not the world.

We, as a country, have a history of destroying wetlands. So if we have some of the most pristine wetlands in the world, why would we not look elsewhere especially if the cost to import would be less than – the cost to the citizens would be less in the future?

**Response 121:** Aerial photography shows the entire proposed mine parcel has been timbered at various times in the last century, with most of it currently subject to continuous harvesting and planting cycles. Roads and borrow areas have further altered the site. After extensive fieldwork, the USACE performed its own functional assessment of the wetlands proposed for impact and those proposed to be used for mitigation. Using UMAM, as discussed in Section 4.4.2, it determined that the wetlands proposed for

impact averaged about 57 percent of their potential functional value. The UMAM impact scores that FDEP accepted to allow issuance of Tarmac's permit were actually considerably lower than those assessed and used by the USACE. Other locations were evaluated in the alternatives analysis, as was the No Action Alternative, as discussed in Section 2.2.

**Comment 122:** WAR finds the DEIS review of wetlands impact credible for Alternatives 1-8. The wetlands in question include stream flow paths, deep water ponds and other features of undisturbed wetland communities. In balance, such features are found predominately in the western and southern quadrants of the proposed project area (Vol 2, Append E, Fig 3 and Append G, Fig 2-4 & Map 4). Streams designated as no mine areas predominate in the eastern portion of the project area. Of the 8 Alternatives, only Alternatives 1 & 6 [sic] avoids impacts or potential impacts (direct and indirect) to streams. Alternative 7 minimizes impacts to wetlands in proportion to acreage destroyed.

WAR does not dispute findings in the UMAM technical analysis of the project area. We do not however agree that the loss of 720 - 2069 (Alternatives 7 and 2) acres of wetlands habitat can be compensated for by enhancement in the mitigation parcel. As noted in Table S-2 (Vol. 1, pg 18), Alternatives 2 and 5 result in net UMAM functional losses. Moreover, analysis by the Corps indicates the southwestern portion of the Alternative 2 project area and a very large portion of the mitigation parcel will be inundated prior to project completion. We realize no "mitigation" from submerged lands and characterize this as "mobile mitigation." Mitigation areas should be areas that are no more likely to flood than the areas they are "mitigating". Mitigation should be durable. With that said, it appears the minimum impact to wetlands is found in Alternatives 1 & 7 respectively.

Multiple references are made in the DEIS to the degraded state of wetlands in the project area due to silviculture operations. In context of habitat, WAR concurs with this assessment. The nature of silviculture operations is one of short term harvest cycles and as such there is little opportunity for establishment of hardwoods or other significant plant species which are significant in support of other biological communities. In context of hydrologic function, we find no significant degradation directly attributable to silviculture operations other than impediments to flow as a result of roadways and deficient drainage architecture identified by the applicant. Therefore, we conclude the significance of silviculture impacts to be overstated and largely meaningless. The comparative metric at hand for the mining parcel of the project should not be what the land forms and biological communities were in 1940, but what they are today.

As noted by the team that prepared the Wetlands Delineation Report for the State of Florida, "this area has some of the most pristine wetlands in the nation if not the world."

**Response 122:** The USACE recognizes the commentor's concerns about sea-level rise potentially impacting the proposed mine and mitigation areas. Sea-level rise is discussed in Sections 3.6.2 and 4.2.1. As discussed in Section 5.1, any USACE permit, if issued for one of the action alternatives in the EIS, would include a mitigation plan that adheres to the requirements of 33 CFR Part 332 – *Compensatory Mitigation for Losses of Aquatic Resources*. These requirements include financial assurances; a stated preference for in-kind over out-of-kind mitigation; and a need for adaptive management that anticipates the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. Any USACE permit, if issued, would also include special conditions with detailed timeframes and success criteria for the mitigation activities.

For the comment regarding use of current community conditions for wetland assessments, UMAM does not allow this. This site is subject to timbering activities unregulated by the USACE. Pine plantations are generally not high-functioning wetlands, particularly for wildlife habitat. A hydric hammock habitat where hardwoods were removed and replaced with pine trees would be less diverse and likely function at a reduced level; immediately after a harvest, overall function would be at an even lower level. Assessing one moment in time could encourage timing timbering or other activities to depress scores. To properly assess a wetland habitat's functional value, land use and long-term conditions, including original potential function, must be considered. The entire proposed mine parcel has been timbered at various times in the last century, with most of it currently subject to continuous harvesting and planting cycles. The UMAM

impact scores that FDEP accepted to allow issuance of Tarmac's permit were actually considerably lower than those assessed and used by the USACE.

**Comment 123:** My other thing is if we berm all the way around this thing and somewhere in this hundred years we're going to get this storm and we're going to turn this big thing into nothing but a big lake and there will be no critters left in there. They're either going to drown or be displaced.

And then this gravel or whatever it is is going to be disbursed all over these wetlands we're trying to protect and it's just going to turn into a big chalky lake when it all dries up. So somewhere in this hundred years, that whole area, 4,000 acres, is going to turn into a chalk pit.

**Response 123:** The applicant's proposed berm would be around active mining pits and remaining lakes. Most wildlife that might populate these areas would be expected to be water-dependent and less likely to be negatively impacted by rising lake waters. Filled mine pits would be "over-filled" to be converted to uplands, and would not exist as pits. Groundwater levels would maintain lake water levels in unfilled or any partially filled pits, similar to the excavated areas between the mine site and U.S. Route 19.

**Comment 124:** Third point I was wondering is you mentioned that two of the alternates, I think it was Alternative 2 and I think Alternative 5 have negative UMAAM [sic] scores and I was wondering if it's possible for the Corps to give a permit if there's a negative UMAAM [sic] score or does that require either a denial of that option or more mitigation?

**Response 124:** The primary purpose of UMAM is to determine if proposed mitigation is sufficient to offset proposed impacts. The USACE's UMAM assessment of the proposed impacts and mitigation found that the impacts of Alternatives 2 and 5 could not be compensated for by the mitigation plan. During the USACE's Section 404(b)(1) Guidelines compliance analysis, the USACE district engineer can determine that a permit may not be issued because of the lack of appropriate and practicable compensatory mitigation. Section 4.4.2 of the EIS includes the UMAM evaluation.

**Comment 125:** And then the fourth point was in this executive summary that you distributed this evening, on Page 20 there seems to be an inconsistency about mitigation and S 91 [sic] in number one there it says that the goal is to recreate the landscaping mosaic as it occurs in 1963 mosaic photographs and that recognizes there was already timbering going on, where in a few paragraphs later on it says that the goal is to restore the historic Gulf Hammock community types. That's a very different and more ambitious goal. So I'm wondering what is the reality of what the mitigation expectation is there.

**Response 125:** The applicant states in Section S.9.1 that the 1963 photograph is before the more intensive silviculture land use began, even though some timbering had already occurred. The applicant intends to re-establish the species composition and structure of those 1963 plant communities as they are expected to closely resemble the historic conditions and their locations. A more detailed description of the mitigation plan is included in Chapter 5 and Appendix G of the EIS.

**Comment 126:** The proposed mitigation plan fails to fully mitigate for all of the impacts to wetlands associated with this alternative (2). Absent a showing that the need for aggregate from this mine can only be satisfied by the applicants preferred alternative (alternative 2), we would argue that 40 C.F.R. § 230.10(a) and (d) require the Corps to reject Alternative 2 as its preferred alternative and instead choose an alternative that significantly minimizes the mines [sic] impacts on wetlands.

**Response 126:** The commentor's opinion is noted. The NEPA process requires that all reasonable alternatives be evaluated. The EIS includes evaluating eight onsite action alternatives (see Section 2.2.2), and the USACE will consider all of the potential environmental impacts of and mitigation associated with each alternative, as well as the public input received during the comment period, before making a decision.

**Comment 127:** Additionally, the mining companys [sic] preferred alternative would include damage of up to 3,000 acres of wetlands.

**Response 127:** Tarmac's preferred alternative, described in Section 2.2.2.2, would impact approximately 2,069 acres of wetlands.

**Comment 128:** The project would require the destruction of considerable pristine wetlands in this area of Florida. We realize a mitigation area is planned, but natural wetlands are irreplaceable. (Craig Pittman and Matthew Waite, St. Petersburg Times, Special Report - Vanishing Wetlands, "Mitigated wetlands usually fail," December 17, 2006.)

**Response 128:** Comment noted. The entire proposed mine parcel has been timbered at various times in the last century, with most of it currently subject to continuous harvesting and planting cycles. Roads and borrow areas have further altered the wetlands on the site. After extensive fieldwork, the USACE performed its own functional assessment of the wetlands proposed for impact and those proposed to be used for mitigation. Using UMAM, as discussed in Section 4.4.2, it determined that the wetlands proposed for impact averaged about 57 percent of their potential functional value. As discussed in Section 5.1, any USACE permit, if issued for one of the action alternatives in the EIS, would include a mitigation plan that adheres to the requirements of 33 CFR Part 332 – *Compensatory Mitigation for Losses of Aquatic Resources*. These requirements include financial assurances; a stated preference for in-kind over out-of-kind mitigation; and a need for adaptive management that anticipates the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. Any USACE permit, if issued, would also include special conditions with detailed timeframes and success criteria for the mitigation activities.

**Comment 129:** Wetlands: Damages to wetlands will be unavoidable under any of the action alternatives. While the acreage of affected wetlands varies in alternatives 2 through 8, a minimum of 720 acres of wetlands will be directly impacted (alternative 7), with a maximum of almost 2,070 acres impacted (alternative 2). While up to 4,630 acres of wetlands are proposed for mitigation to offset these damages, plans should be devised to minimize damages from the outset, allowing mitigation only as a last resort and closely scrutinizing the ecological value of what is being lost compared to the ecological value of what will be gained- and ensuring that mitigation is properly monitored to ensure success. Mitigation is not solely about numerical acreage, but about the functionality of the ecosystem affected. The proposed impact to wetlands, even the most minimal proposed impact of 720 acres, is unacceptable and should not be permitted.

**Response 129:** The USACE recognizes the commentor's opposition to mining for any of the alternatives that result in impacts on wetlands. The USACE follows a sequential review in reviewing permit applications. If avoidance of all impacts is not practicable, then minimization of unavoidable impacts is required. Mitigation of unavoidable impacts is the final step. The mitigation review using functionality, as suggested by the commentor, was performed by the USACE as described in Section 3.3.2 of the EIS.

**Comment 130:** EPA notes that Alternatives #2 and #5 appear less desirable for selection as the LED PA [least environmentally damaging practicable alternative] because they result in a net reduction of wetlands function as a result of onsite limestone mining (e.g., Alternative #2 results in a loss of 288 UMAM units and Alternative 5 results in a loss of 161 UMAM units). The DEIS notes that the proposed mitigation would not be sufficient to "off set" the functional loss for Alternatives #2 and #5. After examining Alternatives #3, #4, #6, #7 and #8 and reviewing Table 4-7, EPA notes that the FLUCCS code impacts (functional Hardwood wetlands = 616b + 617 + 621 + 630) clearly demonstrate the superiority of Alternative #7, as it has the least impacts to these important habitats. We note that Alternative #7 has 65 acres of hardwood wetland impacts, while Alternative #3 has 235 acres of hardwood wetland impacts, Alternative #4 has 170 acres of hardwood wetland impacts, Alternative #6 has 144 acres of hardwood wetland impacts, and Alternative #8 has 243 acres of hardwood wetland impacts.

**Response 130:** The USACE recognizes the commentor's assertion that Alternative 7 is the least environmentally damaging practicable alternative.

**Comment 131:** We do not agree that the loss of 720 - 2069 (Alternatives 7 and 2) acres of wetlands habitat can be compensated for by enhancement in the mitigation parcel. Alternatives 2 and 5 result in net wetland losses which are not even proposed to be compensated by the mitigation... "Mitigation" calculations for Alternatives 3, 4, 6, 7 and 8, appear to suggest the mitigation areas are adequate to compensate for wetland losses, but that is only true for the very near term.

**Response 131:** Thank you for your comment. After extensive fieldwork on the site, the USACE performed its own functional assessment of the wetlands proposed for impact and those proposed to be used for mitigation. Using UMAM, as discussed in Section 4.4.2, the USACE determined that increases in wetland functions would occur through elimination of ongoing timbering activities, perpetual preservation, and enhancement and restoration. UMAM utilizes time lag as part of its calculation to ensure that mitigation compensates for functional losses, measured over time. Any permit, if issued, would include conditions that require mitigative lift totals to stay ahead of functional losses using the UMAM functional assessment method. As discussed in Section 5.1, any USACE permit, if issued for one of the action alternatives in the EIS, would include a mitigation plan that adheres to the requirements of 33 CFR Part 332 – *Compensatory Mitigation for Losses of Aquatic Resources*. These requirements include financial assurances and a need for adaptive management that anticipates the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. Any USACE permit, if issued, would also include special conditions with detailed timeframes and success criteria for the mitigation activities.

**Comment 132:** Rising sea level will cause much of the “mitigation” area to be inundated and become submerged lands over 110 years. There is no “mitigation” from submerged marshes. The applicant must be required to provide “mitigation areas” selected such that they are no more likely to flood than the areas they are “mitigating.”

**Response 132:** USACE recognizes the commentor’s concerns about sea-level rise potentially impacting the proposed mine and mitigation areas. Sea-level rise is discussed in Sections 3.6.2 and 4.2.1. As discussed in Section 5.1, any USACE permit, if issued for one of the action alternatives in the EIS, would include a mitigation plan that adheres to the requirements of 33 CFR Part 332 – *Compensatory Mitigation for Losses of Aquatic Resources*. These requirements include financial assurances; a stated preference for in-kind over out-of-kind mitigation; and a need for adaptive management that anticipates the risk, uncertainty, and dynamic nature of compensatory mitigation projects and guides modification of those projects to optimize performance. Any USACE permit, if issued, would also include special conditions with detailed timeframes and success criteria for the mitigation activities.

**Comment 133:** We teach our youth the importance of the wetlands [sic] and salt marsh to our environment. Five miles away Tarmac is proposing an enormous mining operation designed to destroy that environment.

**Response 133:** Thank you for your comment.

## **I.9 THREATENED AND ENDANGERED SPECIES**

**Comment 134:** What was mentioned in passing was the sighting of protected species, the Wood Stork, Roseate Spoonbill, and the eastern indigo snake. While it is mentioned in the report that the closest nesting is in northern Citrus and northern Levy County, there is also a colony of both the species nesting just five miles to the southwest on Bennett's Creek west of Yankeetown.

I'd be glad to take you in my pontoon and show you probably between Roseates and Wood Storks, probably a hundred of both species. So I think there's probably more going in [sic] there than we can imagine.

There also has [sic] been sightings of black bear on Pumpkin Road in the area of the mine and also on -- I have it on the back here. I have photographs for you taken by a hunter that hunts off Butler Road and these were taken in 2011. And this has also been reported by the state foresters. This must be considered more thoroughly since these animals, as well as the eastern indigo snake, are on the federal and state endangered or threatened species lists.

**Response 134:** The USACE completed a full evaluation of potential impacts on the wood stork (see Section 4.6.1), including consultation with the U.S. Fish and Wildlife Service (FWS) under Section 7 of the Endangered Species Act (ESA). The proposed mine site has only a relatively small amount of suitable foraging habitat for this species, and no preferred nesting habitat exists on the mine site. The FWS concurred with the USACE that adverse impacts on wood storks are unlikely. As noted in Section 4.6.2,

impacts on the roseate spoonbill would be minimal and similar to those described for the wood stork. In Section 3.5.2, the EIS mentions that the state-listed black bear likely occurs in the King Road area, but only as a secondary range. The Florida Fish and Wildlife Conservation Commission concluded that there is no evidence that there is a core population or evidence of reproduction. The FWS has provided the USACE a detailed Biological Opinion on the eastern indigo snake (see Appendix E of the EIS). The FWS concluded that the proposed action is not likely to jeopardize the existence of the federally listed eastern indigo snake. However, the FWS did propose stringent monitoring requirements, as described in Section 5.6.2.

**Comment 135:** And when you talked about the wildlife like, you know, female panthers don't exist? Wow, that's really out there. And gopher turtles weren't even mentioned? Come on now. You know, they're everywhere.

**Response 135:** Section 3.5.1 of the EIS describes the FWS's determination regarding the absence of female panthers in this region of Florida. The gopher tortoise is discussed in Section 3.5.2 of the EIS.

**Comment 136:** We believe that there is a breeding population of Florida panther here in Levy County, extending from Citrus County all the way north.

**Response 136:** Section 3.5.1 of the EIS describes the FWS's determination regarding the absence of a breeding panther population in this region of Florida.

**Comment 137:** So I understand that the US Fish and Wildlife Service opinion is that what we're seeing is either a bobcat or male panthers, but personally I think the US Fish and Wildlife Service is wrong about their opinion.

**Response 137:** Thank you for your comment.

**Comment 138:** It's against the Coastal Zone Management Act of 1972. Competing demands have resulted in loss of living marine resources, wildlife, permanent and adverse changes to ecological systems.

**Response 138:** The Federal Coastal Zone Management Act is discussed in Appendix F of the EIS. FDEP issued an Environmental Resources Permit (Permit Number 0244771-002) indicating that the proposed action (Alternative 2 in the EIS), as described in Chapter 2 of the EIS, is in compliance with requirements set forth in the Florida Coastal Zone Management Program and thus satisfies the Coastal Zone Management Act requirements. Impacts on wetlands, vegetation, and wildlife (ecological systems and wildlife) are discussed in Sections 4.4, 4.5, and 4.6, respectively.

**Comment 139:** Panthers. Having been here 52 years and being a woodsy person who's camped in the woods, hiked in the woods, down all the creeks and all, I've seen panthers before back then. I've seen panthers now. There's a regular panther that patrols on the Withlacoochee Gulf Preserve out there when Dr. O'Wiley was the owner of it. You see it and you can't tell me that if the boys are around that there's no girl. They've got to be out there or the boys wouldn't stay there.

**Response 139:** Section 3.5.1 of the EIS describes the FWS's determination regarding the absence of a breeding panther population or female panthers in this region of Florida.

**Comment 140:** And then my fifth and last question concerns with the wildlife, something that I was involved in Pinellas County with the endangered species. The Wood Storks used to be, I'm not sure if they still are or not, were considered as equally protected as eagles. And, you know, there's a 600-foot no activity area and I was wondering if there had been a study done to determine if there's a Wood Stork rotary adjacent to this mine site, how that would impact the developable area?

**Response 140:** Wood stork studies were completed for the mining site, mitigation site, and the surrounding area. As described in Section 3.5.2 and shown in Figure 3-15 of the EIS, the closest nesting colonies of wood storks are 25 miles from the Tarmac King Road Limestone Mine site. As discussed in Section 4.6.1, the FWS concurred with the USACE determination that the applicant's preferred alternative (Alternative 2) may affect, but is not likely to adversely affect, the wood stork.

**Comment 141:** And the other thing was about the panthers. You know, you said that it's a corridor for male panthers and I'm saying to myself, Well, if they're trying to get to females, it sounds like their corridors are pretty important. You know, it's not something we can say whether there's females or not, this corridor is extremely important. And there are efforts to introduce panthers in other parts of the state other than below the Caloosahatchee. Sighting occurrences agreed to by the U.S. Fish and Wildlife Service; as well as the local testimony of recent sightings of mothers with cubs. Under these circumstances, we believe that formal consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act is required.

**Response 141:** Section 3.5.1 of the EIS describes the FWS's determination regarding the absence of a breeding panther population or female panthers in this region of Florida. To date, panthers have not been introduced into other parts of the state. The FWS has not confirmed local sightings in any correspondence that the USACE has been provided. The sole nearby identification the USACE has seen indicated that FWS determined that a game camera photograph provided to the FWS and the USACE depicted a bobcat, rather than a panther. As discussed in Section 4.6.1, FWS believes that while transient male panthers could occur in the area, FWS does not believe a breeding population is present, and has concluded that the proposed project is not likely to adversely affect the Florida panther.

**Comment 142:** Wood stork rookeries require no noise or disturbance within 600 feet to thrive. Clearly, the activity propose by the applicant will violate this requirement. Negative impacts on the wood stork should, therefore, be addressed within the final EIS.

**Response 142:** Wood stork studies were completed for the mining site, mitigation site, and the surrounding area. As described in Section 3.5.2 and shown in Figure 3–15 of the EIS, the closest nesting colonies of wood storks are 25 miles from the Tarmac King Road Limestone Mine site. As discussed in Section 4.6.1, the FWS concurred with the USACE determination that the applicant's preferred alternative (Alternative 2) may affect, but is not likely to adversely affect, the wood stork.

**Comment 143:** The applicant has committed to conducting eastern indigo snake surveys onsite. To better identify potential impacts to other wildlife resources, we also recommend that these surveys be expanded to include state-listed species potentially occurring on site (e.g., gopher tortoise and wading bird surveys). Wildlife surveys should follow established survey protocols approved by the USFWS and FWC. Basic guidance for conducting wildlife surveys may be found in the Florida Wildlife Conservation Guide (<http://myfwc.com/conservation/value/fwagl>).

**Response 143:** The eastern indigo snake surveys would be required as a result of consultation with the FWS under Section 7 of the ESA. Wildlife surveys are discussed in Section 3.5. Little suitable habitat for those species mentioned (gopher tortoise and wading birds) currently exists on the proposed mine site. While surveying for additional species can be discussed with the applicant, the USACE does not have authority to mandate this state agency's recommendations regarding state-listed species if a permit is issued. Mitigation of impacts on threatened and endangered species is discussed in Section 5.6.

## **I.10 VEGETATION, WILDLIFE AND HABITAT**

**Comment 144:** I had some graduate students from the University of Florida come in and check the karst, the sinkholes surrounding the proposed dairy site, and I see here under Chapter 6, Page 61, the Biological Research Associates. I do not see where they have taken into account species that might be below ground in that karstology [sic]. In Florida we have specific species, that some of them are located only in one sinkhole, one area and nowhere else, and a survey has not been done yet on those species, if those species are situated within that area.

**Response 144:** The small, shallow solution sinkholes found on this site are common throughout this region, as noted in Section 3.6.1, and do not represent a habitat unique to this site. The FWS's list of threatened and endangered species in this county does not include species specifically found in sinkholes.

**Comment 145:** And I don't -- I didn't see any kind of a guarantee about the impact on the coastal or marine environments which support such a rich variety of wildlife and habitat.

**Response 145:** Any USACE permit, if issued, would require monitoring and remedial and/or enforcement action if predicted impacts were exceeded. This is discussed in Section 5.6 of the EIS.

**Comment 146:** I would say gopher turtles, you just kind of dismissed the gopher turtles as if they're not impacted, but the last I heard is there's 111 or 135 species that are -- rely on -- bugs that rely on these gopher turtle nests. So just to say that, you know, we don't -- it's not impacting them, it's not true because it affects the whole ecosystem. It affects the gophers, frogs.

**Response 146:** The gopher tortoise is discussed in Section 3.5.2 of the EIS.

**Comment 147:** The EIS fails to fully analyze the impacts of permanent changes to wildlife systems.

**Response 147:** Section 4.6 of the EIS contains a detailed analysis of the potential impacts on wildlife, including threatened and endangered species and state-listed species of special concern.

**Comment 148:** Florida black bears have the potential to occur within the mine parcel and vicinity. Human-bear conflicts may cause a wide range of impacts from property damage to safety concerns. Electric fencing is an available tool that has been proven effective in deterring bears. For the safety of both the bears and the mine personnel, we recommend the applicant consider fencing for each active mine unit (please refer to enclosed bulletin for more information).

**Response 148:** The project area has been subject to recent land use, including hunting and logging, and the USACE has no evidence of human-bear conflicts occurring. Black bear habitat is discussed in Section 4.6.1 of the EIS.

**Comment 149:** The DEIS provides quality information and detail for water and engineering aspects of the project; however, the biology sections are less informative. We suggest that the Final EIS include information on life history, local populations, reproductive status of wildlife and fish in the affected area. This information would enable the reader to better understand the implications of the project.

**Response 149:** The approximately 200 fish and wildlife species observed on the site are listed in Table 3-14. Threatened and endangered species observed or having potential to be found on the site are described in greater detail in Section 3.5.2. Information on life history, reproductive status, etc., on all of these species can be readily obtained from other sources, and is outside the scope of the EIS.

## I.11 AIR QUALITY

**Comment 150:** EPA warns about diesel engine exhaust causing cancer.

**Response 150:** The *Health Assessment Document for Diesel Engine Exhaust* (EPA/600/8-90/057F), published in May 2002, is a comprehensive study using data from the 1960s through the early 1990s to conclude that there is a causal relationship between diesel exhaust and cancer risk in humans. As stated in the document, the majority of the study was based on older diesel-burning engines, and the increased cancer risk was found to be small and could be affected by other factors. In June 2006, the "2007 Highway Rule," promulgated by the EPA, took effect, requiring a 97 percent reduction in the sulfur content of highway diesel fuel from 500 parts per million (ppm) to 15 ppm by 2009. The EPA states that this is the greatest reduction in harmful emissions of soot, or particulate matter, ever achieved from cars or trucks.

Section 4.10.2 of the EIS has been modified to include this information and additional information on the health benefits of the new rule. All diesel equipment used on site by the applicant will be required to comply with applicable Clean Air Act regulations.

**Comment 151:** And I live super, super close and my office is right by Highway 19 and the thought of a thousand diesel trucks, if you've watched one what comes out of their exhaust and that stuff is a cancer causer. And they're going to get stopped at the traffic light because it just works that way. We're going to have a city that has no water, exhaust everywhere, and I just really -- I think you all really need to take into consideration above all the water of our area, the health of the people.

**Response 151:** See response to comment 150.

**Comment 152:** Air Quality – Dust, gas and diesel emissions will contribute to degraded air quality in the area. The dust is proposed to be watered down with spring water, a critically impacted freshwater source for drinking water, recreation and healthy ecosystems.

**Response 152:** The impacts on air quality, including fugitive emissions (dust), for all alternatives are included in Section 4.10 and are determined to be minimal. The applicant is authorized under its SWFWMD permit to withdraw and consume up to 136,800 gallons per day from groundwater for its activities.

**Comment 153:** Dunnellon is a bicycle/pedestrian friendly community. The city promotes a safe environment for its pedestrians and bicyclists as demonstrated in the master planning and street improvements. Heavy truck traffic is hazardous to pedestrians and bicyclists. The noise, fumes and dust are counterproductive to the safe environment the city is achieving. Routing trucks through Dunnellon would be devastating to the quality of life now enjoyed by its citizens.

**Response 153:** Traffic impacts on surrounding communities such as Dunnellon were analyzed in detail. Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 16 percent of its truck traffic would move east on County Road 336 and on to County Road 40. This would equate to approximately 16 trucks during the morning peak hour and 7 trucks during the evening peak hour. These numbers are approximately 1.2 percent of the roads' capacity in the morning peak hour, and 0.5 percent in the evening peak hour, Mondays through Saturdays; trucks would not run on Sundays. In consideration of this county roads' designed weight and traffic capacities, this increase in traffic is not expected to have a significant impact on air quality or overall quality of life in Dunnellon. In addition, the *Marion County 2035 Long-Range Transportation Plan* proposes a bypass to be constructed connecting County Road 40 to U.S. Route 441, which would allow through traffic to avoid the downtown area of Dunnellon. Section 4.15.2.2.1 of the EIS has been revised to include more detail on specific routes in the vicinity of Dunnellon.

## I.12 RAINFALL

**Comment 154:** The water budget calculations used by the applicant are considered inappropriate by WAR. The applicant relies on annual averages for Levy County (54.94") and Citrus County (54.12") (DEIS VOL 2 Ardaman Assoc. Table 1) in water budget calculations.

Due to the meteorological phenomena described as the "sea breeze front," rainfall on immediate coastal features in the region is substantially less than recorded by inshore rain gauges. See the following Web link for dialog:

<http://www.srh.noaa.gov/jetstream/ocean/seabreezes.htm>

This disparity is reflected in the DEIS (Vol. 1, 3.9.1.1, pg 3-66) by varying average rainfall in Tampa (47.52"), Inglis Lock (49.67") and Usher Tower (59.65"). Usher Tower's location relative to the Waccasassa River Basin and project area and rainfall record serves to illustrate the issue of sea breeze fronts quite well.

In 2008 the Florida Office of State Climatologist reported the annual average of rainfall at Cedar Key as 47.41". WAR submits Attachment H (SWFWMD-Bird Creek) as ten years of record for the Bird Creek Rain Gauge. The gauge is located near the end of County Road 40 on the Gulf Coast and within the town limits of Yankeetown. The early years of record are clouded by limited data, however the last 6 years of record dated 9 May 2006 through 8 May 2012 indicate an annual average of 41.91" of rainfall.

WAR contends that water budget calculations which are not based on available local information within the historical record are misleading, without merit, and do not provide a basis for rational decision making. If available local rainfall values are not used in hydrologic calculations all assumptions related to water budgets will be flawed.

The applicant uses regional rainfall and lake evaporation rate assumptions supporting a thesis that rainfall exceeds lake evaporation at the project site (DEIS Vol 2; Appendix D, Ardaman Assoc.; Table 8 “Annual Water Budget for King Road Mine”: Avg rainfall 54”, lake evaporation (LE) 48”, Natural ET 38”). The assumption inappropriately minimizes impacts associated with lake evaporation rate, hydroperiod modification, surface water discharge, aquifer recharge, aquifer drawdown and concludes a budget surplus. However, the local rainfall record suggests potential annual deficits in the range of 6 inches in context of lake evaporation and 12” of rainfall contribution, this being a comparison of the Bird Creek rainfall record and regional averages used by the applicant.

Lake evaporation is significant due to Alternative 2 projections of approximately 1,400 acres of lake pits that will remain at the conclusion of the project. If the applicant’s assumption of average 48”/year LE is accepted, the annual accelerated water loss due to LE will present as ~380,160,035 gallons/year in perpetuity (ET-LE x 1,400 acres). Alternative 7 residual lake pits will generate approximately 1/3 of that loss, or ~126,720,000 gallons/year.

Such modification of the water cycle may induce unforeseen hydrologic impacts in and around the project area. In tandem with prolonged drought such modifications may exacerbate alterations in hydrologic processes improperly considered in the applicant’s analysis.

**Response 154:** The applicant’s calculations were not used. A detailed analysis of rainfall over the last 10 years was performed independently by the USACE’s third-party contractor, SAIC, using every official reporting station within 60 miles of the mine site. There were very wide variations in monthly and annual rainfall due to the fact that the majority of rain that falls in Florida is the result of local thunderstorms. In addition, several of the gauges demonstrated suspect data that were determined by the EIS meteorologist to be of poor quality and not defensible. However, the 5 years that were used in the modeling were from the closest station to the mine site, were a good representation of the overall averages seen in the 10 years reviewed, and contained both dry years and wet years. A similar analysis was performed to determine the representative evapotranspiration values. The modeling results presented in Section 4.2 and Appendix D of the EIS are based on actual data from average, dry, and wet years.

**Comment 155:** The applicant offers meteorological data in support of water budget calculations which is [sic] not applicable to the project location and results in misleading conclusions and/or assumptions.

**Response 155:** The applicant’s data were not used. See response to comment 154.

**Comment 156:** We draw from the same Floridan Aquifer and Swiftmud says “it is fed only by rainfall [sic]” AND IT’S NOT RAINING!

**Response 156:** Comment noted. See response to comment 154.

**Comment 157:** Considering the fact that we – you know, other people have pointed out, you know, we’re seeing the effects of sea level rise, sinkholes because of the drought period. Your study, when you did the aquifer studies it was like 2004 to 2008, I think we’re in the – we were in a six-year drought period during that time.

**Response 157:** The period of record for the groundwater modeling was chosen because there was significant data available (rainfall, well data, etc.) to achieve the most representative results for wet (2004), dry (2007), and average conditions. Sea-level rise is discussed in Section 3.6.2. Rainfall averages are discussed in Section 3.9, and the rationale for choosing the modeling period of reload is discussed in Appendix D of the EIS. The groundwater models included water loss through lake evaporation and pumping for mining processes, as described in Appendix D of the EIS. Modeling indicates impacts from groundwater drawdown at the proposed Tarmac King Road Limestone Mine (see Section 4.2.2) are expected to be minimal. The largest change in average local groundwater tables

would be  $\pm 0.3$  feet, and this impact would extend only relatively short distances from the project site, as depicted in Figures 4–4 and 4–5. This minimal alteration is not expected to cause sinkholes to form.

**Comment 158:** But what concerns me about that again is using an average really doesn't tell the story of what are the worse case drawdown scenarios. Because that's really what's important here, once you draw down to a level that allows, you know, freshwater flows to back up enough that saltwater can come in, you know, there's really not much fixing that. So that I have a big concern with using averages. It's just -- it just does not tell us what the real ground situation is.

**Response 158:** Averages, as well as both wet and dry extremes, were used in the groundwater modeling to present results that represent the average and worst-case conditions. This analysis included potential effects from saltwater intrusion (see Section 4.3.2.2).

**Comment 159:** We had talked earlier about the rainfall measure that you looked at and you said it was five-year sort of lean measurement over a period of years and when -- I just want to point out that the last 20 years have been the lowest rainfall levels in the last 120 years. That's 20 years. Not exactly, you know, your run of the mill drought. That looks a lot like a rainfall pattern.

**Response 159:** A detailed analysis of rainfall over the last 10 years was done using every official reporting station within 60 miles of the mine site. There were very wide variations in monthly and annual rainfall due to the fact that the majority of rain that falls in Florida is the result of local thunderstorms. However, the 5 years that were used in the modeling were from the closest station to the mine site, were a good representation of the overall averages seen in the 10 years reviewed, and contained both dry years and wet years. The modeling results presented in Section 4.2 and Appendix D of the EIS are based on actual data from average, dry, and wet years.

Regarding the comment about the last 20 years being the driest in the last 120 years, the SWFWMD produces annual summaries of rainfall by county across its district dating back to 1915. These averages are available on the SWFWMD website at [http://www.swfwmd.state.fl.us/data/hydrologic/rainfall\\_data\\_summaries/](http://www.swfwmd.state.fl.us/data/hydrologic/rainfall_data_summaries/). The annual rainfall for Levy County for the period 1915–2011 was examined in 20-year periods. The 1930s–1950s were the driest periods, and the 1970s–1990s were the wettest. The 20-year periods over the last 5 years ending in 2011 were dry, but were not in the top 15 driest 20-year periods since 1915. However, they were the driest in the last 50 years.

**Comment 160:** So, you know, we certainly have to talk about climate change and we certainly have to look at the fact that our rainfall has decreased and very likely will continue to be lower than it used to be. So I think that your modeling is wrong for that reason.

**Response 160:** See response to comment 159 for the information on rainfall. Greenhouse gas emissions are discussed in Sections 3.9.2 and 4.10, and sea-level rise is discussed in Sections 3.6.2 and 4.2.1. As discussed in Section 2.2.2.2, if approved, any accompanying permit would require comprehensive monitoring and reporting to demonstrate that the environmental impacts being realized are consistent with the impacts estimated in the EIS. If environmental impacts were to exceed estimated levels, this would trigger mandatory actions that could include remediation, additional mitigation, or permit modifications. Chapter 5 details the proposed wetland mitigation measures.

**Comment 161:** Consider using rainfall data collected at the SWFWMD's Bird Ck gauging site located iv [sic] SW Levy Co., approximately 7mi southwest of the Tarmac mine lease. Groundwater model estimates of recharge are very sensitive to changes in rainfall totals and improved rainfall data sets should be incorporated into the model as early as possible. Bird Ck data sets appear to be complete for 8 calendar years (1/1/2004 through 1/1/2011) and are assumed to more accurately reflect rainfall at the King Rd mine site. Bird Ck. is probably the only gauge close to the mine site capable of documenting characteristics of rainfall events at the coast. Compared with other rainfall data sources used by various contractors cited in the DEIS, average annual rainfall totals collected at the Bird Ck site appear to be significantly lower than data sets collected at other locations cited in the DEIS.

**Response 161:** A detailed analysis of rainfall over the last 10 years was done using every official reporting station within 60 miles of the mine site. There were very wide variations in monthly and annual rainfall due to the fact that the majority of rain that falls in Florida is the result of local thunderstorms.

However, the 5 years that were used in the modeling were from the closest station to the mine site, were a good representation of the overall averages seen in the 10 years reviewed, and contained both dry years and wet years. The modeling results presented in Section 4.2 and Appendix D of the EIS are based on actual data from average, dry, and wet years.

**Comment 162:** Average annual rainfall used in the DEIS for Levy County (54.94") and Citrus County (54.12") are inappropriate and ignore available local data. In 2008 the Florida Office of State Climatologist reported the annual average of rainfall at Cedar Key was only 47.41". The Bird Creek rain gauge located near the end of County Road 40 on the Gulf Coast and within the town limits of Yankeetown, for 9 May 2006 through 8 May 2012 indicate an annual average of 41.91" of rainfall in the immediate area. If the applicant wishes to use the long term County averages for calculations, they should also show calculations for local and current rain gauges. People and habitats are affected by what is actually happening in a particular place at a particular time, not by the expectation that over larger areas and long time periods, everything will average out.

**Response 162:** The applicant's calculations were not used. A detailed analysis of rainfall over the last 10 years was done by the USACE's third-party contractor, SAIC, using every official reporting station within 60 miles of the mine site. There were very wide variations in monthly and annual rainfall due to the fact that the majority of rain that falls in Florida is the result of local thunderstorms. In addition, several of the gauges demonstrated suspect data that were determined by the EIS meteorologist to be of poor quality and not defensible. However, the 5 years that were used in the modeling were from the closest station to the mine site, were a good representation of the overall averages seen in the 10 years reviewed, and contained both dry years and wet years. The modeling results presented in Section 4.2 and Appendix D of the EIS are based on actual data from average, dry, and wet years.

**Comment 163:** In the context of requesting a permit for 110 years, the applicant should also consider scenarios of prolonged drought and prolonged periods of excessive rainfall and the impacts they may have.

**Response 163:** The modeling results presented in Section 4.2 and Appendix D of the EIS are based on actual data from average, dry, and wet years.

**Comment 164:** But you don't know this drought will be over next year. The reason Florida Power gave 3,000 acres to the state was because there was [sic] 30 years of no rain. They couldn't run their hydroelectric plant at the main dam. They couldn't function. They had to keep running the Inglis plant to try to keep water in the river just to keep it from drying up. So water is very important. You don't know when this drought will end.

You can't just give these people this – this right to take away from the citizens.

**Response 164:** Thank you for your comment.

### **I.13 SEISMICITY/NOISE**

**Comment 165:** The applicant suggests that blasting vibration exceedances identified in the DEIS can be managed, but offers no supporting evidence. Indeed, examination of reduced charge geometry also failed to meet standards established by Federal authority and adopted by the State.

**Response 165:** The commentator is correct that the proposed reduction in charge geometry still results in an exceedance of the Florida statute for drywall beyond mining year 40 as currently proposed. Should the USACE select any alternative besides Alternative 1 or 7 and issue a permit, additional blasting mitigation would be required of the applicant beyond year 40. This is discussed in Sections 5.7 and 5.9 of the EIS.

**Comment 166:** Quarry blast impacts – the south central portion of the mine near Butler Rd is 815 feet from Deer Haven Campground, generating a vibration that is 117-138% of the state threshold. In fact, the local nuisance level of 65db would be exceeded if two pieces of heavy equipment are operating simultaneously near the southern boundary

**Response 166:** The applicant has proposed sound mitigation in Section 5.9 of the EIS that would likely lower the noise level at the Deer Haven Campground to below the 65 decibels A-weighted (dBA) level. Should the USACE select any alternative besides Alternative 1 or 7 and issue a permit, additional blasting mitigation would be required of the applicant beyond year 40. This is discussed further in Section 5.7 of the EIS.

**Comment 167:** The Draft Environmental Impact Statement (DEIS) stipulates exceedance of Florida standards for peak particle velocity (PPV) due to blasting activity (Vol 1, Ch 4, Table 4-13) in the area of the “Deerhaven Campsites/Residence along Butler Road” beyond year 40 of the project in context of project alternatives. The closest residence is found 815’ from the mining area. All alternatives except Alternatives 1 and 7 result in PPV exceedances beyond year 40, ranging from 117% to 138%.

**Response 167:** Comment noted. See response to comment 166.

**Comment 168:** Standards in use by the State of Florida as administered by the State Fire Marshal are codified in Chapter 552 FS. These standards are based on United States Bureau of Mines, Report of Investigations 8507, Appendix B - Alternative Blasting Level Criteria (Ch 552.30(2)FS). There are several observations we consider pertinent to this aspect of compatibility.

1) The standards were developed primarily in a dry environment, meaning the tests were, in part or whole, made in strata of limestone and other mineral strata that were not submerged, or beneath prevailing aquifer levels. 2) Elevated or stilt homes tend to magnify vibration levels in the living space floor areas.

3) Blast vibrations transmitted through aqueous karst geology are simultaneously transmitted by materials of different density such as limerock and water. These variables may confound attempts to minimize vibration impacts due to reinforcement of shock wave amplitude and/or frequency modification.

4) Residents in Inglis, Yankeetown and northwest Citrus County have experienced real property damage and decades of obnoxious vibration emanating from the Cemex Inglis Quarry even when proximity to the blast area exceeds 7,500’. The depth of the Cemex Quarry is approximately 74’. Charge quantities used in blasting for the mine are thought to range from 40,000 pounds to 65,000 pounds. Presumably Tarmac will use equal or greater charge weights. Requests by residents in Citrus County and Yankeetown for the Cemex mine operator to place seismic sensors in elevated home structures for vibration evaluation have been declined. 5) State law places the burden of proof on residential property owners when claims are filed for compensation due to damage to improvements/structures on real property resulting from blast vibration.

WAR generally finds that regulations used by the state to be ineffective in mitigation of complaints about blasting vibration and questionable in context of property damage mitigation. The DEIS Section 4.7.4.2 (pg 4-48 Vol 1) refers to “Tarmac 2010: Vol 1, Appendix 5” in this discussion in context of the objective of reducing vibrations to imperceptible levels. The experience of WAR members and residents in the community leads to a conclusion that such objectives cannot be achieved within far more distant offsets than 815’. As a result of this WAR finds support only for Alternatives 1 and 7.

**Response 168:** The ineffectiveness of various regulations outside of the control of the USACE is beyond the scope of the EIS. However, the USACE notes the commentator’s concerns, as well as his support only for Alternatives 1 and 7. Should the USACE select any alternative besides Alternative 1 or 7 and issue a permit, additional blasting mitigation would be required of the applicant beyond year 40 as part of the USACE’s public interest review. Noise mitigation is discussed in Sections 5.7 and 5.9 of the EIS.

## I.14 CULTURAL RESOURCES

**Comment 169:** The EIS fails to fully analyze the impacts of the loss of ecological and cultural values essential to the well-being of citizens.

**Response 169:** The impacts of the proposed mine on ecological values such as wetlands, vegetation, and wildlife are discussed thoroughly in Sections 4.4, 4.5, and 4.6, respectively. The impacts of the proposed mine on cultural resources are presented in Section 4.13 for all alternatives. The Florida State

Historic Preservation Officer has approved the applicant's management measures for known and unknown cultural resources.

**Comment 170:** The district, listed on the National Register of Historic Places, was originally residential and is now a mix of residential and commercial space. The corridor also hosts several annual community-wide events such as Boomtown Days in the spring and Jazz Up Dunnellon in the fall. The addition of heavy truck traffic would be a negative impact to this district. The DEIS does not address the historic and therefore does not follow the National Historic Preservation Act of 1966. Property values along the truck route will decrease as truck traffic increases.

**Response 170:** The USACE coordinated with the Florida State Historic Preservation Officer and requested additional information from the commentor about concerns over impacts on historical resources. The USACE determined that the Dunnellon Boomtown Historic District is outside the project's area of potential effect in accordance with Section 106 of the National Historic Preservation Act. Traffic impacts on surrounding communities such as Dunnellon were analyzed in detail. Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 16 percent of its truck traffic would move east on County Road 336 and on to County Road 40. This would equate to approximately 16 trucks during the morning peak hour and 7 trucks during the evening peak hour. These numbers are approximately 1.2 percent of the roads' capacity in the morning peak hour, and 0.5 percent in the evening peak hour, Mondays through Saturdays; trucks would not run on Sundays. County Road 40 runs along two sides of the eight blocks of the historic district. There is currently no weight restrictions for trucks using this road. The size and weight of trucks and their loads, as well as safety requirements that apply to the operation of commercial vehicles on the state's public highways, are regulated by the FDOT. In consideration of the roads' designed weight and traffic capacities, the minor increase in traffic related to the mine is not expected to have an adverse impact on the historic properties. In addition, the *Marion County 2035 Long-Range Transportation Plan* proposes a bypass to be constructed connecting County Road 40 to U.S. Route 441, which would allow through traffic to avoid the downtown area of Dunnellon. Section 4.15.2.2.1 of the EIS has been revised to include more detail on specific routes in the vicinity of Dunnellon.

## I.15 SOCIOECONOMICS

**Comment 171:** The report states the cost from Mexico in 2010 was \$6.52 per ton, the Caribbean \$8.53 per ton, and Alabama \$8.12 per ton. The cost per ton in Florida in 2010 was \$11.77. Thus, importing would cost saving -- would be a cost savings to the citizens.

In the report it said that transportation costs from the proposed King Road Mine was [sic] \$6.00 a ton. If shipped from the Port of Citrus, which is approximately seven miles south, it could be expected the shipping costs would be similar. It would also be closer to existing rail lines as well as the proposed Suncoast Parkway which will be approximately two miles south of the Port of Citrus. This also would create far better paying jobs and larger numbers of new employment than what the applicant has proposed.

**Response 171:** In 2011, Port Citrus was added to the Florida Seaport and Economic Development Council as the 15th deepwater port in Florida. Port facilities do not currently exist there; however, the Citrus County Port Authority is undertaking a feasibility study in an effort to establish a port. The port would be located along the Cross Florida Barge Canal, and the proposed Tarmac King Road Limestone Mine is regarded by Citrus County as a high candidate for port recruitment. The lower costs associated with sea transport could expand the potential market area of the proposed mine. Currently, there are no plans for the port to import crushed rock. The depth of the Cross Florida Barge Canal is a limiting factor on vessel size, and the Citrus County Port Authority states that its predominant clients will likely be barge-based operations. This would influence the distance to viable sources and destinations of imports and exports, including limestone aggregate. It will likely be several years before any development begins and materials begin to flow in to and out of the port. Section 2.2.1.3 has been revised to include Port Citrus information.

**Comment 172:** And Ms. Howe came all the way from Pasco County to tell us how important our ecotourism is. And if nothing else, okay, you don't need your water. Well, okay, apparently you missed Survivor when they didn't bring all their water. But, anyway, ecotourism is a big, big deal now because so many people have made this mistake of, Okay, we've got money in our pocket now, but now what's happened?

**Response 172:** NEPA requires that the EIS evaluate all impacts on the environment of a proposed action. The *King Road EIS* includes a detailed analysis of all the potential environment impacts, including those that are key to ecotourism. The USACE will evaluate all of these impacts, including input from the public in deciding upon the least environmental damaging alternative. Sections 3.14.6 and 4.14.2 of the EIS have been revised to include discussions on ecotourism.

**Comment 173:** Tourists are the economic benefit of Levy County. Carol McQueen states that tourists for 2008 Levy revenues were \$8,100,000. Tourists don't come to look at open lime rock pits, but to see the trees, the water, and beauty of the Nature Coast.

**Response 173:** Sections 3.14.6 and 4.14.2 of the EIS have been revised to include discussions on ecotourism.

**Comment 174:** My husband and I are residents of Pasco County and I think it was Betty that was talking about the economic dollars that tourism – excuse me – tourism brings in and we are a couple of those tourists.

We come up here and kayak and actually we're even considering buying land in this area. However, we expect it to look like it does now. We're not going to buy land if the beautiful wetlands and everything else are destroyed.

I have frequently walked in the Weeki Wachee Preserve which as you probably know is an old mining area with pit lakes and it's hideous. I mean, everything is dead. It looks like – except for the water, it looks like you could be walking on the moon.

The mine may bring some economic benefits short-term to this area, but once it's gone, whether that's in 30 years or a hundred years, you've got this ugly, dead area. And if you take care of your environment, your tourist dollars and ecotourism income is [sic] going to remain forever.

**Response 174:** USACE understands the commentor's concern regarding aesthetics and ecotourism. In Section 5.2 of the EIS, the applicant has proposed a mitigation plan that would restore the landscape mosaic on adjacent lands to that of 1963. This process would begin within the 4,526-acre mitigation parcel upon project commencement. "No Mine" Areas on the mine parcel would also be enhanced and preserved. Some mining pits would also be refilled and returned to timber production or other uses by the landowner. These changes would be expected to have no more than minimal effect on ecotourism activities in the area, considering the distance from where they may occur to the project location, and the minimal offsite secondary impacts expected from the project. Sections 3.14.6 and 4.14.2 of the EIS have been revised to include discussions on ecotourism.

**Comment 175:** And that brings up the next question is the projections do show some increase in population and presumably an increased need for some aggregate, but I think the science that those projections are based on is very questionable because what we're still seeing in our local communities here is [sic] losses in people. It may be bottoming out, but we have not seen the turn yet. Their projections go out to 2020. That's what, eight years away and this mine is going to go on for another hundred years past that. So I think the projections are very questionable.

**Response 175:** The projections are based on the latest available data that have proven historically to be correct in predicting future populations in the near term. The USACE recognizes the commentor's concern regarding long-term trends and will take this into account during its evaluation of the permit decision. Section 2.2.1 of the EIS has been revised to include updated population estimates through 2050.

**Comment 176:** Tourist revenues for Levy County in 2008 were \$8.1 million dollars, providing a direct economic and jobs benefit to the local communities in the area of the proposed mine site. These visitors come for the fishing, the water, the wildlife and the quiet beauty. The competing demands of the proposed mine creates [sic] a loss of the natural and scenic characteristics of the area. The EIS fails to fully analyze the impacts of decreasing public use of coastal space.

**Response 176:** The USACE understands the commentor's concern related to decreasing public use of coastal space. However, the King Road mine and mitigation site are currently privately owned and surrounded by other privately owned land. As illustrated by Figure 1–1 in Chapter 1 of the EIS, the mine site is located over 4 miles inland from the coast, and would not decrease public use of coastal space. Revised discussions on ecotourism are included in Sections 3.14.6 and 4.14.2.

**Comment 177:** When addressing the issue of need, consideration must be given to the economics of alternative sources of aggregate, such as the lower cost per ton of aggregate that is not mined in Florida; the potential to create a few jobs at the expense of thousands, and the costs and effects to Florida citizens at the end of the mining period, including potential contamination of the aquifer.

**Response 177:** The cost per ton of aggregate for mines outside of Florida presented in Tables 2–1 and 2–1 of the EIS does not include shipping of the aggregate to the final destination. These additional shipping costs can be substantial and are discussed in Section 2.2.1. The potential impacts on groundwater are discussed in Section 4.2.2

**Comment 178:** I think the mine would be nothing but disruptive in the long run. And I'll be very honest with you, I don't like seeing, a boring company comes in, they invest their money, they could care less about what we got over here. You know, the money's going someplace. It ain't coming here. And for the few employees they're getting out of it, it's just not cost-effective.

**Response 178:** The socioeconomic benefits and costs are analyzed in Section 4.15. The financial benefit to the local area was determined to be approximately \$40 million annually (see Table 4–19).

**Comment 179:** Expertise in preparing the DEIS as listed in Chapter 9 does not include professionals in historic preservation and property appraisal. The DEIS does not address the adverse impacts to Dunnellon which is within the 70 mile radius nor does it provide mitigation to those impacts. The final EIS needs to address the adverse impacts to Dunnellon and provide mitigation for the impacted school zones, historic district, loss of property value and loss of quality of life for all the citizens of Dunnellon.

**Response 179:** The USACE understands the commentor's concerns over potential impacts on the City of Dunnellon. The USACE coordinated with the Florida State Historic Preservation Officer, and requested additional information from the City of Dunnellon regarding its concern over impacts on historical resources. The USACE determined that the Dunnellon Boomtown Historic District is outside the project's area of potential effect in accordance with Section 106 of the National Historic Preservation Act. While direct impacts would not occur in the City of Dunnellon, which is located 15 miles from the mine site, the potential for secondary impacts was also evaluated. Traffic impacts have the highest potential for secondary, or indirect, impacts from this project on surrounding communities such as Dunnellon, and these were analyzed in detail. Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 16 percent of its truck traffic would move east on County Road 336 and on to County Road 40. This would equate to approximately 16 trucks during the morning peak hour and 7 trucks during the evening peak hour. These numbers are approximately 1.2 percent of the roads' capacity in the morning peak hour, and 0.5 percent in the evening peak hour, Mondays through Saturdays; trucks would not run on Sundays. There is currently no weight restrictions for trucks using this road. The size and weight of trucks and their loads, as well as safety requirements that apply to the operation of commercial vehicles on the state's public highways, are regulated by the FDOT. In addition, the *Marion County 2035 Long-Range Transportation Plan* proposes a bypass to be constructed connecting County Road 40 to U.S. Route 441, which would allow through traffic to avoid the downtown area of Dunnellon. In consideration of the roads' designed weight and traffic capacities, the impacts of this minor increase in traffic, or from other effects of the King Road mine, are not expected to have more than a minimal impact on the City of Dunnellon school zones,

the historic district, property values, or quality of life. Section 4.15.2.2.1 of the EIS has been revised to include more detail on specific routes in the vicinity of Dunnellon.

**Comment 180:** Property values along the truck route will decrease as truck traffic increases. Heavy truck traffic generates noise, dust and fumes. A major study of noise costs conducted for the 1982 Federal Cost Allocation Study "assumed a 0.4 percent decrease in the value of a housing unit for each dBA (Leq) increase over a threshold value of 55 dBA." (TranSafety).<sup>1</sup> The DEIS did not address the loss of property values.

**Response 180:** Traffic impacts on surrounding communities such as Dunnellon were analyzed in detail. Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 16 percent of its truck traffic would move east on County Road 336 and on to County Road 40. This would equate to approximately 16 trucks during the morning peak hour and 7 trucks during the evening peak hour. These numbers are approximately 1.2 percent of the roads' capacity in the morning peak hour, and 0.5 percent in the evening peak hour, Mondays through Saturdays; trucks would not run on Sundays. In consideration of the roads' designed weight and traffic capacities, this minor increase in traffic is not expected to have a significant impact on property values. In addition, the *Marion County 2035 Long-Range Transportation Plan* proposes a bypass to be constructed connecting County Road 40 to U.S. Route 441, which would allow through traffic to avoid the downtown area of Dunnellon.

The 1982 Federal Cost Allocation Study was revised and reissued in 1997. Section III of the 1997 report discusses the costs associated with highway transportation as it relates to noise. Table III-9 lists the average percentage change in value of residential property per decibel over threshold as 0.4 percent. However, the text cautions the reader that the costs were derived to estimate external costs and are not intended to be used for assessing damage to developments adjacent to highways.

Both the Levy County (Sec 50-349) and Citrus County (2010-A05) noise ordinances list daytime (7:00 a.m.–10:00 p.m.) noise thresholds of 65 dBA for residential properties and 75 dBA for commercial properties. Noise from vehicles on commercial rights-of-way such as highways are regulated by *Florida Statutes* and are exempt from local noise ordinances. However, for comparison, a 10-wheel diesel engine dump truck has a typical average sound emission of 74 dBA when measured at 50 feet (see Table 1 of Appendix K). That level drops to 68 dBA at 100 feet and below 65 dBA at approximately 150 feet. The increased truck traffic from the King Road mine described above and in Section 4.15.2.2.1 of the EIS will not increase sound levels above threshold levels for properties in commercial districts or those in residential districts more than 150 feet from the nearest highway. As a result, there should be little to no impact on property values. The noise study is provided in Appendix K.

**Comment 181:** Tourism is a major economic factor on the Nature Coast. The noise, pollution, and truck traffic can only harm our currently thriving tourist industries.

**Response 181:** The impacts of the proposed mine on noise, air quality, and transportation are included in Sections 4.12, 4.10, and 4.15.2.2.1, respectively. The noise study is provided in Appendix K. In addition, Sections 3.4.6 and 4.1.4.2 have been revised to include a discussion of ecotourism. The impacts were determined to be minimal for all alternatives.

**Comment 182:** There is no positive socio-economic impact by the mine's small payroll. Heavy traffic and bad water will turn away the fishermen who enjoy our river and bay. It will lower our property values and make the area we love, undesirable.

**Response 182:** The socioeconomic benefits and costs are analyzed in Section 4.15. The financial benefit to the local area was determined to be approximately \$40 million annually (see Table 4–19). A detailed discussion of truck traffic impacts is contained in Section 4.15.2.2.1. Traffic impacts on surrounding communities such as Dunnellon were analyzed in detail. Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 16 percent of its truck traffic would move east on County Road 336 and on to County Road 40. This would equate to approximately 16 trucks during the morning peak hour and 7 trucks during the evening peak hour. These numbers are approximately 1.2 percent of the roads'

capacity in the morning peak hour, and 0.5 percent in the evening peak hour, Mondays through Saturdays; trucks would not run on Sundays. The complete traffic study has been added as Appendix J. In consideration of the roads' designed weight and traffic capacities, this minor increase in traffic is not expected to have a significant impact on property values. Revised discussions on ecotourism are included in Sections 3.14.6 and 4.14.2. The impacts of the proposed projects on offsite wells and the aquifer are discussed in Section 4.2.2 and were determined to be minimal. The potential for impacts on saltwater intrusion from mining was analyzed and determined to be minimal, as discussed in Section 4.3.2.2. To verify these impacts would be minimal, groundwater level monitoring would be made a part of any permit, if issued, as discussed in Section 4.2.2.6. The impacts of the minor increase in traffic, or from other effects of the King Road Mine, are not expected to have more than a minimal impact on property values or the quality of life.

## I.16 TRUCKS AND TRAFFIC

**Comment 183:** And the thing what [sic] upsets me the most is the 100-year duration of semis.

**Response 183:** A detailed discussion of truck traffic impacts is contained in Section 4.15.2.2.1.

**Comment 184:** Just a couple comments that have to do with when you did your traffic presentation. If I'm not mistaken, and I may be, the Links [sic] & Associate who's represented by the applicant and those are the traffic studies that were done in here, I just think that the traffic study, if you look on Page 3-83, you're getting a traffic study report from traffic on county road -- from US 19 to County Road 40 into Marion County, there is a weight limitation on that road and why that would be included in the study would be beyond the others. Maybe they want to know that vehicles have another place to go.

I believe it's a ten-ton weight limit on that road and that is included in your report as I guess a feasible way to transport the aggregate. As well as county road from US 19 North to 121 to County Road 336 to County Road 40 which then goes into Marion County. I understand there's people here from Dunnellon and I would be concerned about truck traffic going through their historic district. There's no way around it at this time.

**Response 184:** The portion of County Road 40 immediately east of U.S. Route 19 would not be used by dump trucks transporting aggregate. This portion of road was included in the June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) to capture the potential for “non-truck project trips” that might be added to that road as a result of the project. These trips could include mine employees or vendors. County Road 40 runs through the Dunnellon Boomtown Historic District. In consideration of the road's designed weight and traffic capacities, the minor increase in traffic related to the mine is not expected to have more than a minimal impact on County Road 40. The USACE coordinated with the Florida State Historic Preservation Officer, and requested additional information from the City of Dunnellon regarding its concern over impacts on historical resources there. The USACE determined that the Dunnellon Boomtown Historic District is outside the project's area of potential effect in accordance with Section 106 of the National Historic Preservation Act. In addition, the *Marion County 2035 Long-Range Transportation Plan* proposes a bypass to be constructed connecting County Road 40 to U.S. Route 441, which would allow through traffic to avoid this downtown area of Dunnellon. Section 4.15.2.2.1 of the EIS has been revised to include more detail on specific routes in the vicinity of Dunnellon.

**Comment 185:** And the traffic impact will be minimal? Come on, this is little Inglis. You know, a thousand trucks, huh-huh.

**Response 185:** The detailed traffic study discussed in Section 4.15.2.2.1 took into account the maximum daily truck traffic and determined that the effect on the capacity of the road would still be significantly below the FDOT rating.

**Comment 186:** WAR finds no basis to contest Level of Service review regarding traffic volume increase. We are mindful however that such modification of traffic volume relating to truck transit of the US19/CR40 intersection in Inglis will result in higher risks to residents, increased traffic noise, road wear and so forth.

**Response 186:** Comment noted.

**Comment 187:** Tarmac traffic reports states 2,000 rock trucks will haul rock, 1,000 in and 1,000 out, with 80 percent going south through Inglis.

**Response 187:** The project proposes 250 trucks making a total of 500 round-trips a day. The detailed traffic study discussed in Section 4.15.2.2.1 took into account the maximum daily truck traffic and determined that the capacity of the road would still be significantly below the FDOT rating. Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 52 percent of its truck traffic would move south through Inglis.

**Comment 188:** Could I just say it takes 500 feet to stop a loaded rock truck. They can't stop for our red light.

**Response 188:** The size and weight of each truck and load, as well as all other safety requirements that apply to the operation of commercial vehicles on the state's public highways, are regulated by the FDOT.

**Comment 189:** Those trucks every few seconds, nobody can cross 19.

**Response 189:** The Lincks & Associates, Inc., 2010 traffic analysis presented in Table 4–18 of the EIS shows that the additional traffic on U.S. Route 19 at the intersection of State Route 121 would increase by 56 vehicles during the peak-hour traffic over the current background level of 343 vehicles. That 16 percent increase is still significantly below the 2,390-vehicle peak hourly capacity of the roadway. The complete traffic study is provided in the final EIS as Appendix J.

**Comment 190:** And as far as these trucks, I didn't know that the trucks interest you going north or south. I would think if I were running an operation like this, I'm saying, Levy County, don't worry about me, I'm going to Citrus County with these trucks. And what keeps them from taking a left as soon as they -- this thing is approved? Levy County just kind of ignores it now because it's not going to impact us, it's all Citrus County, but as soon as you guys let go, I'm turning left.

**Response 190:** Tarmac's June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) projects approximately 52 percent of its truck traffic would move south through Citrus County.

**Comment 191:** Putting a truck on the road every 45 seconds would change the character of the Nature Coast into the industrial mining coast.

**Response 191:** Thank you for your comment. The Lincks & Associates, Inc., 2010 traffic analysis presented in Table 4–18 of the EIS shows that the additional traffic on U.S. Route 19 at the intersection of State Route 121 would increase by 56 vehicles during the peak-hour traffic over the current background level of 343 vehicles. That 16 percent increase is still significantly below the 2,390-vehicle peak hourly capacity of the roadway. The complete traffic study is provided in the final EIS as Appendix J. The impacts on ecotourism are discussed in Sections 3.14.6 and 4.14.2 and are anticipated to be minimal.

**Comment 192:** Traffic – the peak year of 2014 could be further exacerbated by the proposed construction of the Duke/Progress Energy nuclear power plant in Levy County. The changes to the small communities and rural areas of Levy County from these large vehicles running around the clock will be devastating to the way and pace of life for residents and visitors.

**Response 192:** Note that the data presented in Table 4–18 include the traffic from the proposed LNP. Cumulative impacts of all additional foreseeable actions, including the LNP, are evaluated in Section 4.17 of the EIS.

**Comment 193:** I have one more question about the level of service on the roads now. You said -- you made some comments about the number of vehicles. I just wonder what is the LOS for US 19 now in this area that's going to be affected?

**Response 193:** Table 3–28 in the EIS (page 3–84) lists the current (2009 study year) peak-traffic and peak-hour capacity on six major road segments, including U.S. Route 19, to be utilized by the Tarmac King Road Limestone Mine traffic. The complete traffic study is provided in the final EIS as Appendix J.

**Comment 194:** The proposed Tarmac King Road Limestone Mine raises concerns for the City of Dunnellon. In Section 3.14.5 of the Draft Environmental Impact Statement (DEIS) it is reported that the distribution of crushed rock by truck would cover a 70 mile radius. The City of Dunnellon is located within this 70 mile radius. Heavy truck traffic as proposed by the mine would be devastating to the City of Dunnellon. County Road 40 is the west entrance into Dunnellon. Although it is noted in Section 4.15.2.2.1 of the DEIS that no truck traffic was assumed to travel on CR 40 because it currently has a weight restriction of 10,000 pounds, the City is concerned that the weight limit will be increased allowing trucks to use the road. When one reads the DEIS there is an implication that weight limits will be increased on CR 40, since it is noted that the existing weight restrictions are “current.” If CR 40 cannot be used, then why did Links [sic] and Associates study it for capacity and what routes will trucks use to get to Marion County? If the weight limits are increased allowing trucks to use CR 40 then the DEIS does not follow the NEPA. Truck traffic in Dunnellon would adversely impact two school zones, a National Register Historic District, property values and the pedestrian/bicycle friendly environment of Dunnellon. Dunnellon Middle School is located near CR 40 as well as a private school. Truck traffic would interfere with school traffic and children walking and bicycling to school. This would create a safety hazard for school children in the area. Dunnellon's Historic District is accessed by a section of CR 40 which also leads downtown.

**Response 194:** That portion of County Road 40 immediately east of U.S. Route 19 would not be used by dump trucks transporting aggregate. This portion of road was included in the June 2010 Lincks & Associates, Inc., *Transportation Analysis: Tarmac – Levy County* (included in the final EIS as Appendix J) to capture the potential for “non-truck project trips” that might be added to that road as a result of the project. These trips could include mine employees or vendors. The traffic study projects approximately 16 percent of its truck traffic would move east on County Road 336 and on to County Road 40. This would equate to approximately 16 trucks during the morning peak hour and 7 trucks during the evening peak hour. These numbers are approximately 1.2 percent of the roads’ capacity in the morning peak hour, and 0.5 percent in the evening peak hour, Mondays through Saturdays; trucks would not run on Sundays. In consideration of the roads’ designed weight and traffic capacities, this minor increase in traffic is not expected to have more than a minimal impact on school zones, the historic district, property values, or overall safety. County Road 40 runs through the Dunnellon Boomtown Historic District; however, the *Marion County 2035 Long-Range Transportation Plan* proposes a bypass to be constructed connecting County Road 40 to U.S. Route 441, which would allow through traffic to avoid this downtown area of Dunnellon. Section 4.15.2.2.1 of the EIS has been revised to include more detail on specific routes in the vicinity of Dunnellon.

**Comment 195:** Truck noise and dust are of additional concern, and heavily loaded trucks will cause damage to roads and increase the number of accidents.

**Response 195:** Impacts from noise and dust are described in Sections 4.10 and 4.12. The size and weight of each truck and load, as well as all other safety requirements that apply to the operation of commercial vehicles on the state’s public highways, are regulated by the FDOT.

**Comment 196:** Based on the traffic study and the volume of truck traffic turning onto and off of U.S. Route 19 at King Road, the traffic engineering consultant (Lincks & Associates) recommended that left and right turning lanes in excess of 400 feet be established along U.S. Route 19. The FEIS should clarify if the Florida Department of Transportation (FDOT) would support the installation of these turning lanes, and note the responsible entity for financing their construction.

**Response 196:** Specific Condition 16 of Levy County’s order approving Tarmac’s special exception application for the mine project states that Tarmac is obligated to “construct, or cause to be constructed” improvements to the intersection of U.S. Route 19 and King Road, which include the referenced turning lanes, “in accordance with plans approved by FDOT.” Accordingly, Tarmac is the responsible entity for financing their construction, in accordance with plans approved by the FDOT. Section 5.12 of the EIS has been revised to include this information.

**Comment 197:** The truck traffic that would result from a mine this size would play havoc with many of our local roads. I shudder to think what the intersection of US19 and CR40 in Inglis will be like or US19 and CR 44 in Crystal River. Apparently the only proposed changes to the highway are a couple of turn lanes.

**Response 197:** The Lincks & Associates, Inc., 2010 traffic analysis is presented in Table 4–18 of the EIS. The table shows that the peak hourly traffic volumes on eight major intersections would be well below the peak hourly FDOT-rated capacities. The complete traffic study is provided in the final EIS as Appendix J.

## I.17 COSTS

**Comment 198:** And you got to remember, this thing's going to last for eternity. The berm's going to be there for eternity. Somebody's going to have to pay for it. It's not going to be the applicant. The state's going to get it, people in this room, our people will be paying for it. More importantly there's a potential future costs to the citizens who in the end will carry the burden 20, 50, a hundred or a thousand years from today.

**Response 198:** The land proposed for mining would be leased from the property owner by the applicant. As proposed, the mined areas, including the berms, would remain in private ownership post-project. The proposed mining plan is included in Appendix B of the EIS.

**Comment 199:** The environmental impact statement acknowledges the fact that there are costs, external costs if you would, to people other than the applicant in providing this. And that, of course, is the mission before the Corps is to weigh those costs in this thing.

**Response 199:** The USACE will utilize the information in the EIS to determine the least environmentally damaging practicable alternative using the Clean Water Act Section 404(b)(1) Guidelines found at 40 CFR Part 230, and considering the public interest factors in 33 CFR 320.4(a). The USACE will then issue a permit if the project is determined to be in the public interest.

**Comment 200:** Address the costs and effects to Florida citizens at the end of the mining period.

**Response 200:** See response to comment 198.

**Comment 201:** Who will pay for the damage to our health, roads and safety?

**Response 201:** Determination of liability from any detrimental effects on health, roads, and safety is outside the purview of the EIS.

## I.18 CUMULATIVE IMPACTS/DIRECT/INDIRECT

**Comment 202:** The DEIS fails to fully and adequately analyze the indirect, secondary and cumulative impacts of the mine and any other known or reasonably foreseeable development over the proposed 100 year project life. In this instance, the Corps has wholly failed to include any real consideration of impacts in the DEIS. The final EIS must address this deficiency by discussing all reasonably foreseeable indirect impacts of the current permit, including but not limited to:

(i) any and all environmental impacts of increased development stimulated by the mine, including equipment suppliers, truck stops or vehicle maintenance facilities, restaurants and the like;

(ii) any and all environmental impacts associated with increased truck traffic and other traffic patterns or the level of traffic on local roadways, include future road maintenance, road widening or other reasonably foreseeable road work; and

(iii) any and all environmental impacts of increased residential or commercial development stimulated by the proposed project, such as the construction of restaurants or businesses serving workers at the mine site; whether the impacts of the proposed project is [sic] contrary to the Levy County Coastal

Management Element in its comprehensive plan, e.g. allowing for additional growth in a coastal high hazard area; increasing growth and development creating disturbance in coastal marshes, wetlands and sea grass beds Cumulative Impacts: In this instance, the Corps' analysis of cumulative impacts is limited to those projects, such as other mines, road work and a proposed power plant(s) that are currently known to the Corps. There is no discussion of projects being currently proposed, designed or discussed for the area over the 100 year life of the proposed mine or any reasonably foreseeable development that might be expected to occur in Levy County over the next 50-100 years.

**Response 202:** When evaluating future actions in its NEPA cumulative impact analyses, Federal agencies are limited to evaluating only those actions that are reasonably foreseeable. Section 4.17 contains a detailed analysis that includes the cumulative impact of all reasonably foreseeable actions that would have an impact on the affected environment. The USACE considered reasonably foreseeable impacts of development in the affected environment over the proposed 100-year project life in Section 4.17. It is not reasonably foreseeable that the additional employment of approximately 35 direct employees will result in the need for additional housing complexes, roads, or restaurants. The additional truck traffic is evaluated in Section 4.15.2.2.1. The complete traffic study is provided in Appendix J. The analysis of the cumulative impacts on road traffic found that there would be little impact on the current FDOT road capacities even when including the potential peak construction traffic of the proposed LNP (see Table 4–18). No reasonably foreseeable impacts associated with future road maintenance, road widening, or other impacts associated with increased traffic were identified. Decisions regarding compliance with Levy County's and Florida's policies and plans have been rendered by those entities, and are outside the scope of the EIS. No reasonably foreseeable environmental impacts of increased residential or commercial development were identified.

**Comment 203:** The applicant has proposed to alleviate the significant dust generated by using 22mgd of spring water. The Corps must evaluate the cumulative effects on spring water flow in the area, already critically reduced by decades of drought and over pumping.

**Response 203:** General Water Use Permit No. 20013273.000, issued by the SWFWMD, allows the applicant to use up to 13 million gallons of water per day for crushing, screening, and washing rock, with most of the water pumped from the mine pits to the processing plant pond and re-pumped back to the mine pits, i.e., recycling. This permit allows the withdrawal and consumption of up to 136,800 gallons per day from groundwater. The cumulative impacts of this withdrawal, coupled with those anticipated from the proposed LNP, are discussed in Section 4.17.4.1.

**Comment 204:** Despite the relative quality of the Tarmac DEIS, the evaluation of the adverse direct, indirect and cumulative environmental impacts is inadequate and a supplemental DEIS is required, pursuant to 40 C.F.R. §1502.9(c)(1) & (2). Those inadequacies in the LNP DEIS and final EIS were addressed in my previous comment letters on the LNP DEIS to the Corps and NRC. I am including a copy of those previous comment letters dated 10/26/10, 11/27/10, 3/12/12 and 4/26/12 with the related attachments, as part of the attachments incorporated into this comment letter. All of my comments in those letters are relevant to the irreversible environmental impacts that would occur from the proposed Tarmac mine.

**Response 204:** The commentor refers to comments submitted for the *LNP EIS*. The comments were not specific to the *King Road EIS*. Adverse direct, indirect, and cumulative environmental impacts for the *King Road EIS* were evaluated in Chapter 4.

**Comment 205:** The proposed action is NOT a wetland-dependent activity and would result in irreversible adverse direct, indirect and cumulative environmental impacts on wetlands, floodplains, special aquatic sites, other waters including Outstanding Florida Waters, wildlife habitat and federally endangered and threatened species. Therefore, an alternative site is presumed to exist. Furthermore, the evidence provided with this comment letter is sufficient to conclude that these irreversible adverse direct, indirect and cumulative environmental impacts are NOT capable of being "mitigated" and that the proposed "mitigation," "restoration" and "preservation" described in Chapter 5 of the Tarmac DESI [sic] cannot be executed because of the hydroperiod alterations that would occur from the proposed Tarmac mine, singly and cumulatively in combination with those from any or all of the proposed LNP, the proposed Knight sand mine and the proposed Adena Ranch projects.

**Response 205:** The USACE recognizes that limestone mining is not a water- or wetland-dependent activity; therefore, filling of wetlands is not a requirement to acquire limestone. The USACE performed its alternatives analysis, including evaluating no action alternatives, in accordance with NEPA, as described in Chapter 2. The wetlands found in the proposed mitigation area are primarily groundwater-driven wetlands that do not exhibit hydroperiod (ponded conditions). Groundwater modeling performed by the USACE's third-party contractor, SAIC, as described in Section 3.1.3 and Appendix D, shows that groundwater impacts off site will be minimal. The cumulative impacts on groundwater of this project in combination with other reasonably foreseeable impacts are described in Section 4.17.4.1.

#### **I.19 MISCELLANEOUS/ETC.**

**Comment 206:** So I think you need to look beyond the immediate area and truly understand what St. Johns Water Management District is doing, SWIFTMUD, Suwannee River Water Management District.

**Response 206:** The scope and boundaries used to evaluate cumulative impacts are described in Section 4.17. Activities conducted by water management districts outside of the boundaries identified in Section 4.17 were determined to be outside the scope of the EIS.

**Comment 207:** And then about the storm berms being not in accordance with the Levy County height.

**Response 207:** The berm designs and dimensions were included in the applicant's Special Exception Application to Levy County in June 2010, and Levy County has rendered its decision on that application.

**Comment 208:** The other thing is that during that involvement with the dairy I discovered as I related before six and a half miles of canals dug in federally regulated wetlands without permits. At that time the Corps of Army Engineers stated that it was the worse [sic] environmental damage they had seen. That totaled about four acres. I believe it was four or five acres of total damage if you combine them.

**Response 208:** Thank you for your comment. Information on cumulative impacts can be found in Section 4.17.

**Comment 209:** Tarmac is against the Levy County comp plan.

**Response 209:** Local land use decisions regarding this project with respect to Levy County's comprehensive plan have been reached by the county and the State of Florida.

**Comment 210:** Water in Gulf Hammock wells turned red with minerals on Tarmac's first dig causing Hugh Futch to abandon his house and move. He lives in Alabama because of that first dig. They hit the mineralized water. There's saltwater under that.

You can't drink that stuff. And Plum Creek in their opening up 70 percent of Levy County to mines, they have poisoned all the oak trees. There's not the first acorn. They have poisoned the deer's food supplies that they live on. The deer are roaming around over the highways looking for food and water because Plum Creek cares nothing about the environment, animals or anybody else.

**Response 210:** Issues pertaining to water quality can be found in Section 4.3 of the EIS. During the evaluation of water quality and groundwater constituents, no red mineral contamination, as described in your comment, was found to have occurred. Therefore, issues of potential environmental impacts of Tarmac's test dig were found to not have a significant environmental impact, as described above. Timbering activities by Plum Creek were identified in Section 3.7.

**Comment 211:** Tarmac is owned by Titan, a Greek company, and is against the public interest of Levy County.

**Response 211:** Thank you for your comment. The socioeconomic analysis of the project is evaluated in Section 4.15.

**Comment 212:** Question No. 1, in your initial presentation you pointed out the fact that this mine project is in the middle of a bunch of state conservation areas. I was wondering if the Army Corps was aware of the fact that the present state government is going through a laundry list of determining a lot of the state conservation lands as surplus and making an active effort to get rid of them. So there's no guarantee that these conservation lands are going to be there to add as a buffer to the wetlands. So they're going to be displaced.

**Response 212:** The presentation slide referenced depicted roads, waterbodies, towns and landmarks, as well as state parks and forests, etc. The purpose of noting the nearby parcels was to provide information on current nearby land use and status. It was not intended to show wetland buffering ability or determine permanency of those land uses.

**Comment 213:** And then my fourth question is because of the closeness to certain public infrastructure such as the town of Yankeetown's public water system, why has there not been the consideration of performance bonds to be required should over the course of the life of this permit, that the owner and operator, you know, have that money available already locked in to be able to mitigate the impacts on private citizens and public infrastructure?

**Response 213:** The analyses performed by the USACE have thoroughly defined the anticipated impacts on private citizens and public infrastructure for each alternative. If the USACE issues a permit for the project, it will include monitoring, reporting and contingency plans for any unforeseen impacts. Financial assurances such as performance bonds will be required for compensatory mitigation components of any permit issued to Tarmac for this application, as discussed in Section 5.2.5. The USACE also has the authority to modify, suspend, or revoke permits if necessary.

**Comment 214:** The application for a conditional use permit for 100 years is contrary to established practice. Conditional use permitting is transitory, designed for uses not normally contingent on a particular jurisdictional zone which are trying to succeed within a reasonable period of time (not 100 years).

**Response 214:** The USACE recognizes the commentor's concern regarding a permit that would authorize mining for 100 years.

**Comment 215:** In the next hundred years I'm sure there's [sic] going to be other children and who's going to be watching that and how is that going to be kept safe? How is our area going to be kept safe?

**Response 215:** If constructed, the King Road Limestone Mine site would be secured against trespassing to protect the applicant's equipment and other assets. The active mining area would be closed to entry by the general public. No public roads would intersect the boundary of this area. All private logging roads would be rerouted around the active mining area or closed to the public. Roads that are closed would be bermed off at the boundary of the active mining area and posted. King Road would be the only access point for all employees, contractors, vendors, and visitors. A gate on the private portion of King Road would be manned by Tarmac security personnel 24 hours a day, 7 days a week, and unauthorized entry would be prohibited. The perimeter of the active mining area would be marked by a firebreak and clearly posted. If allowing access to the remainder of the mine property within the Gulf Hammock Wildlife Management Area (GHWMA) proves to be problematic in the future, Tarmac would ask Plum Creek Timberlands to further restrict access to the GHWMA. The Tarmac King Road Limestone Mine site would not be fenced except for some very specific areas, such as the electric power substation. For additional safety, completed mine pits would have shelved edges that would slope gradually at a 1:3 slope until approximately 6 feet of depth before dropping off.

**Comment 216:** EPA notes from the DEIS that the proposed site would be mined over an approximately 100-year period. EPA's Section 404 Project Manager recommends that any 404 permit issued should include periodic interagency reviews of mining and mitigation activities at least every 5 years, as well as periodic reporting of mining and mitigation activities on an annual or bi-annual basis to the Jacksonville District's Regulatory Division.

**Response 216:** Any Department of the Army Section 404 permit, if issued, would include special conditions requiring substantial monitoring and reporting of both mining and mitigation activities. Periodic interagency reviews will be considered, and determinations on this will be described in the ROD.

**Comment 217:** EPA editorial comments: Recommend adding the site and mitigation “footprints” to Figure 3-4 on p. 3-8. Recommend providing an explanation of why the maximum sustained water table elevation in Figure 3-6 occurs from January - March. Also, recommend providing an explanation for break in data between Nov 07 and Jan 08 in same figure. Legends are not clear in Figures 3-17 thru 3-20. Figure 3-22 -It is hard to orient to North and South as referenced in the text. Suggest revising figure or text to make clearer. Demographics in Table 3-28 - Recommend using more detailed census data (such as census blocks if available) and not just county-level census data. The Census Block Groups described on p. 3-86 should be identified in the text

**Response 217:** The USACE will make the recommended editorial changes.

**Comment 218:** In contrast to prior experiences with such, I was impressed with the quality of DEIS package. I must compliment those individuals for, what is in my limited experience, unprecedented results.

**Response 218:** Thank you for your comment.

**Comment 219:** The applicant has indicated that mine reclamation procedures could be implemented to enhance the habitat and recreational potential of the site's future manmade lakes. Additionally, both mining and habitat enhancement measures could affect traditional hunting and recreational activities on over one-third of the Gulf Hammock Wildlife Management Area. FWC staff has considerable experience with mine land reclamation and with conducting habitat restoration programs, as well as managing public hunting, fishing and recreational use areas; therefore, we encourage the applicant to maintain an active and sustained working relationship with FWC for the reclamation, restoration, and management of this property.

**Response 219:** The USACE appreciates your comments and has forwarded your request to the applicant.

**Comment 220:** I would like to commend you on the quality of the DEIS for the proposed Tarmac mine compared to the vast majority of DEIS documents I have reviewed during the past 20 years and particularly compared to the DEIS for the proposed Combined Licenses for Levy Nuclear Plant Units 1 and 2 (“LNP” and “project”) referenced above.

**Response 220:** Thank you for your comment.

**Comment 221:** Regarding the Tarmac DEIS there are significant new circumstances and information relevant to environmental concerns and bearing on the proposed Tarmac mining action and its impacts. For example, Section 1.5 of the Tarmac DEIS describes a number of “environmental documents” that were “evaluated for consideration of relevant issues.” The LNP DEIS was the first in the list of those documents (Tarmac DEIS, p. 1-4). I did not find a definition of “environmental documents” in the Tarmac DEIS, but in my professional opinion, the DEIS for the proposed LNP should not be considered in the category of “environmental documents.” More accurately, in my opinion the LNP DEIS merely is an attempt at agency justification for authorizing construction and operation of the proposed LNP without complying with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Clean Water Act (CWA), the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (“Magnuson-Stevens Act”) and other federal requirements. In fact, none of the documents listed in Section 1.5 of the Tarmac DEIS appear to provide a scientifically based analysis of adverse direct, indirect and cumulative environmental impacts that the proposed Tarmac mine would have on the federally listed species and other wildlife in the zone of impact for the proposed Tarmac mine and related projects.

**Response 221:** Thank you for your comment. Direct and indirect cumulative impacts were assessed in Section 4.17. The effects on federally listed species and other wildlife in the zone of impact for the

proposed Tarmac mine were evaluated in Section 4.6. The EIS was compiled utilizing a variety of information, including other EISs that contained information relevant to the evaluation of this application. A list of these documents can be found in Section 1.5.

**Comment 222:** The Tarmac King Road Limestone Mine project is locate adjacent to the Waccasassa Bay Preserve, a Land and Water Conservation Fund site. Please consult with Mary Ann Lee with the Florida Department of Environmental Protection .....concerning impacts to the Preserve.

**Response 222:** The FDEP's Florida State Clearinghouse assisted the USACE in ensuring that all state agencies that were stakeholders could be involved in the EIS scoping process and were made aware of the availability of the EIS. On June 4, 2012, the Florida State Clearinghouse notified the USACE it had no comments on the EIS, as Florida's Bureau of Mining and Minerals Regulation staff indicated that the state review was complete after FDEP issued Permit No. 224771-002 for the King Road Mine on November 1, 2010.

**Comment 223:** In Section S.2 and 1.2, the King Road Draft EIS characterizes the project site as being 9,400 acres in size, but the two parcels combined are actually about 9,277 acres in size (4,750.5 acres in the mine parcel, and 4,526.5 acres in the mitigation parcel). While these and other numbers used in these sections of the King Road Draft EIS appear to be approximations, it is unclear why approximations are necessary in some instances but not others, when the precise numbers are in fact available and used elsewhere in the document. Accordingly, we suggest the Corps include the precise numbers in these and all other sections of the Final EIS.

**Response 223:** The USACE has included the precise numbers in the final EIS and has checked the document to ensure consistency of numbers between sections, tables, and text. However, within the text of the EIS, some numbers may be rounded to one decimal place.

**Comment 224:** Typographical corrections: Section S.8.1.1.5 – “are recycled” should read “of recycled” in both instances; Section S.8.1.1.5 – Delete the word “define” after “RCA” near the end of the passage; Section 2.2.1.5 – “are” should read “of”; and, Section 3.5.1 – “nor” should read “not.”

**Response 224:** These typographical corrections have been made in the final EIS.

**Comment 225:** Local residents are deeply concerned about impacts to water resources, blasting vibration and substantial increase of truck traffic through the community of Inglis, Florida.

**Response 225:** The USACE understands and respects the local residents' concern about impacts of the proposed mine in their community. Specifically, the impacts on water resources are discussed in detail in Section 4.2 and Appendix D, blasting and vibration is discussed in Section 4.7.4, and traffic issues are discussed in Section 4.15.2.2.1. The blasting study is provided in Appendix L and the traffic study is provided in Appendix J.

## **I.20 ADDITIONAL COMMENTS RECEIVED AFTER THE PUBLIC COMMENT PERIOD**

Several comments were received after the close of the public comment period on July 11, 2012. These comments are not categorized by issue topic, but are listed by date received. Due to the length of many of these comments, each one is summarized below, followed by responses to each. The full text of each comment may be found at the end of this appendix, with the exception of the voluminous attachments received with the comment on February 28, 2013. Those attachments are posted in full on the *King Road EIS* website at [www.kingroadeis.com](http://www.kingroadeis.com). Where responses resulted in clarifications, additions, or modifications to the draft EIS, those impacted sections are noted in the responses.

**Comment 226 Received 11/06/2012:** The commentor states that a supplemental draft EIS is required for the proposed Tarmac mine because the Center for Biological Diversity (CBD) believes the *Final LNP EIS* is legally insufficient because it fails to adequately assess impacts on all relevant listed and proposed species under the ESA, and the consultation requirements pursuant to the ESA and NEPA were not completed for that EIS. An attached letter dated 10/17/12 from the CBD references impacts on Essential Fish Habitat (EFH) and manatees, Department of the Interior concerns over incomplete lists of plant

species and a lack of surveys for 12 federally protected species, research needed on the grasshopper sparrow, a lack of studies on amphibians, and that the *LNP EIS* does not address impacts on the Floridan Aquifer. The letter states that ESA consultation should be reinitiated on 28 unlisted species. The CBD letter also notes that groundwater removal may impact relative hydroperiod, as could other activities there, through mechanical and passive dewatering. This dewatering could alter the impact of wildfires and saltwater intrusion.

The commentor states that because of these deficiencies in the *LNP EIS*, none of these impacts were included or considered as adverse cumulative effects in the *King Road EIS*; therefore, a supplemental draft EIS is required. The commentor also notes that impacts from the Knight Mine must also be considered.

**Response 226:** According to the Council on Environmental Quality, a supplemental environmental impact statement (SEIS) is required “[i]f an agency has made a substantial change in a proposed action that is relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, a supplemental EIS must be prepared for an old EIS so that the agency has the best possible information to make any necessary substantive changes in its decisions regarding the proposal.” (NEPA’s Forty Most Asked Questions, Question 32 “Supplements to Old EISs” [emphasis added]). In this case, the USACE has evaluated all information provided to it and has incorporated it into the EIS. Therefore, at this time an SEIS is not required. The CBD’s concerns are specific to the LNP project; however, the commentor’s concerns regarding consideration of these concerns in the cumulative effects evaluation in the *King Road EIS* are addressed as follows.

Impacts on EFH from the proposed Tarmac mine are not expected to be adverse, as described in Sections 4.6 and 4.17.4.5. Information was added to Section 4.6.1 to address impacts on manatees. It was determined that the impacts on manatees would be minimal. The FWS lists the endangered grasshopper sparrow as known to, or believed to, occur in six counties of Florida. The closest boundary of these six counties is over 60 miles from the proposed Tarmac King Road Limestone Mine project site. In addition, the open grassland habitat the species prefers is not found on the project site; therefore, impacts on the grasshopper sparrow are not expected and not addressed in the EIS. The Department of the Interior provided comments directly to the USACE on the *King Road EIS*, but did not express concerns over incomplete lists of plant species, lack of surveys for federally protected species, or the lack of studies on amphibians. Therefore, the more-generalized comments to which the commentor referred are specific only to the *LNP EIS* and are not within the scope of the *King Road EIS*.

The CBD letter the commentor references lists 28 species of concern. Using the USGS source the CBD references (*Freshwater Macrofauna of Florida Karst Habitats*), 8 of these 28 species are known to occur in the same surficial hydrologic subregion as the project site. This surficial hydrologic subregion is sizeable, covering all or part of 13 Florida counties. These 8 species are either obligatory cave dwellers with special adaptations for living in complete darkness (trogllobites), including blind crayfish, amphipods, and salamanders, or are snails found in springs. Trogllobites rely on outside energy sources, such as detritus that washes in through sinkholes and other cave entrances, or fecal material from troglonexes (organisms that use both cave and surface habitats such as bats, cave crickets, woodrats and the like) that feed outside caves. Without these organic inputs, the trogllobitic community could not exist. There is no evidence of springs or caves with surface openings on the proposed Tarmac mine site. Therefore, these cave-dwelling species are not expected to occur on the proposed mine site. The groundwater modeling performed for the project shows that offsite impacts on groundwater levels would be minimal and would not impact nearby springs, and thus would not impact any snails that may occur there. Groundwater modeling also indicates that mining activities would result in less than a  $\pm 0.3$ -foot change in the average water level beyond the proposed Mine Areas. Changes of this magnitude in average local water tables are expected to have negligible to minimal effects on nearby wetlands, as described in Section 4.4.1. Saltwater intrusion is addressed in Section 4.3.2.2. The groundwater models included water loss through lake evaporation and pumping for mining processes, as described in Appendix D of the EIS. The largest change in average local groundwater tables would be  $\pm 0.3$  feet, and this impact would extend relatively short distances from the project site, as depicted in Figures 4–4 and 4–5. This alteration is too minimal to be considered “dewatering” or have any measurable impact on the frequency

or intensity of wildfires. The cumulative impacts that would be added by the proposed sand mine (the Knight Mine) are addressed in Section 4.17.3.8.

**Comment 227 Received 12/02/2012:** The commentor co-authored a study in 2012 titled, "Preferential Groundwater Flow Pathways and Hydroperiod Alterations Indicated by Georectified Lineaments and Sinkholes at Proposed Karst Nuclear Power Plant and Mine Sites," accessed through <http://www.ccsenet.org/journal/index.php/jsd/article/view/22628>. The commentor asserts that this publication addresses what are adverse cumulative impacts from the proposed Tarmac mine discussed in the draft EIS for that project and for the nuclear power plant and other mines, all proposed to be constructed in the highly fractured Levy County area. The commentor states that groundwater pumping is known to result in preferential flow through fractures and sinkholes and that no groundwater models that considered induced preferential flow through karst conduits, including through the fractures on those proposed sites and surrounding vicinity, were prepared for the proposed LNP or the proposed Tarmac and Knight mines. The commentor asserts that neither the *Draft King Road EIS* nor *Final LNP EIS* even referenced fractures (USACE 2012; USNRC 2010, 2012), and that induced preferential flow and mining in the Floridan Aquifer System also are known to alter natural hydroperiods, resulting in adverse environmental impacts and unsustainable use of the natural resources. The commentor states that those proposed projects also would result in cumulative adverse impacts, such as increasing saltwater intrusion that already has occurred and resulted in the death of trees and natural habitat in the GHWMA, an area ranked as most important habitat by the state, by combining with the adverse impacts that already have occurred from the existing Cemex and Lebanon Station mines. The commentor also asserts that adverse cumulative environmental impacts from the proposed projects also would occur in Big Bend Seagrasses Aquatic Preserve, Waccasassa Bay State Park, Goethe State Forest, and Withlacoochee Gulf Preserve, as well as in other habitat currently supporting populations of federally endangered and threatened species, including, but not limited to, the manatee and red-cockaded woodpecker.

**Response 227:** Section 3.1.2 of the EIS describes the hydrogeology of the aquifer underlying the proposed Tarmac King Road mine site and surrounding area as complex, as past geologic processes (e.g., karstification, fracturing) have created an intricate flow network of springs, conduits, and sinkholes. The groundwater model developed by the USACE's independent third-party contractor specifically for the *King Road EIS* used relatively high values for hydraulic conductivity ( $K$ ) and transmissivity ( $T$ ) that are consistent with the properties of a conduit/fracture flow regime. Use of high values ensures that the model accounts for higher flow velocities and volumes that can occur in these regimes. The final  $K$  and  $T$  values in the transient model were refined by iterative calibrations and tuning of the model to site-specific water conditions such as groundwater levels measured in site and surrounding area monitoring wells and nearby springs. These  $K$  and  $T$  values are in the range of values found in the literature for the Ocala Limestone and Avon Park Formations; thus the model is representative of the regional hydrogeological characteristics and site conditions. After comparing the modeling done by the independent third-party contractor to the information supplied by the commentor, it was determined that the third-party contractor's modeling did examine the issues identified by the commentor. Modeling indicates impacts from groundwater drawdown at the proposed Tarmac King Road Limestone Mine (see Section 4.2.2) are expected to be minimal. The cumulative impacts from the Tarmac King Road Limestone Mine and the other activities described by the commentor are accounted for in Section 4.17.

Saltwater intrusion is addressed in Section 4.3.2.2. Groundwater modeling indicates that the proposed Tarmac mining activities would result in less than a  $\pm 0.3$ -foot change in the average water level beyond the proposed Mine Areas. As described in Section 4.4.1, changes of this magnitude in average local water tables are expected to have negligible to minimal effects on offsite wetlands. Cumulative impacts from past, present, and reasonably foreseeable actions were evaluated in Section 4.17. Potential impacts on endangered species, including the manatee and red-cockaded woodpecker, are described in Section 4.6.1.

**Comment 228 Received 12/02/2012:** This comment is a resubmittal of the 10/17/12 CBD letter provided to the USACE on 11/06/12 (comment 226).

**Response 228:** See response 226.

**Comment 229 Received 2/11/2013:** The commentor adopts as its own, eight sets of comments previously submitted by others on the *LNP EIS* and on the *King Road EIS*. The letter adopting these comments was provided on this date to the USACE EIS project manager for each of these EISs.

The comment letter also referenced three sets of new information that would be provided separately: two official transcripts of U.S. Nuclear Regulatory Commission (NRC) hearings regarding the licensing of the proposed LNP, prefiled direct and rebuttal testimonies, and all attachments and exhibits by the commentor's witnesses for the above-referenced hearings.

**Response 229:** The first four sets of referenced comments are correspondence sent to the USACE *LNP EIS* project manager prior to the release of the *King Road EIS*. Those comments are specific only to the *LNP EIS*, and are therefore outside the scope of the *King Road EIS*.

The next three sets of adopted comments are addressed within this appendix; see responses to comments 30, 31, 56, 57, 204, 205, 220, 221, 226, and 227.

The eighth set of adopted comments referenced appears to be a duplicate of the 12/2/12 comments (comment 227), including another resubmittal of the 10/17/12 CBD letter provided to the USACE on 11/06/12 (see responses 226 and 227).

**Comment 230 Received 2/11/2013:** This comment consists of the 10/31/2012 and 11/1/2012 transcripts of the ASLB evidentiary hearing in the matter of Progress Energy's application to construct and operate two nuclear power reactors in Levy County (the *LNP EIS*), as well as the transcript corrections accepted by the ASLB. The commentor submitted these to each of the USACE EIS project managers as additional information it considers relevant to both the *LNP EIS* and *King Road EIS*. The intervenors opposed to the licensing of the LNP charge that the *LNP EIS* fails to comply with NEPA and NRC's NEPA implementing regulations because the EIS does not specifically and adequately address, and inappropriately characterizes as small, the environmental impacts of the LNP reactors on wetlands, floodplains, special aquatic sites, and other waters. In particular, the intervenors are concerned about the impacts of groundwater withdrawals from the LNP site and the impacts of salt drift and deposition from cooling towers.

**Response 230:** These documents are transcripts from the LNP evidentiary hearing and detail the commentor's concerns regarding what in their opinion are inadequacies in portions of the *Final LNP EIS*. However, the transcripts do not contain comments on the proposed Tarmac King Road Limestone Mine or the *King Road EIS*. The commentor has also not provided any information directly relating these transcripts to the *King Road EIS*. For these reasons, this comment is specific only to the *LNP EIS* and is outside the scope of the *King Road EIS*.

**Comment 231 Received 2/28/2013:** This comment provides more than 2,200 pages of documents related to the aforementioned ASLB evidentiary hearing on the *LNP EIS*. The commentor submitted these documents to each of the USACE EIS project managers as new information relevant to both the *King Road EIS* and the *LNP EIS*. The commentor asserts the *LNP EIS* inadequately addressed the potentially significant impacts of the LNP reactors on freshwater wetlands. The documents include the previously submitted 10/31/12 and 11/01/12 transcripts from the LNP evidentiary hearing, and the 12/03/12 transcript corrections. The commentor also includes the prefiled direct and rebuttal testimonies, and all attachments and exhibits by the commentor's witnesses for the above-referenced hearing. These include the 12/5/12 Intervenors' Proposed Finding of Fact, the 12/20/12 Intervenors' Proposed Rebuttal Findings, the 7/31/12 Intervenors' Response Statement of Position, three Rebuttal Exhibits, four documents with Rebuttal Testimony, four documents of Direct Testimony, and 117 Exhibits for Direct Testimony dated 6/29/12 ranging from single photographs to reports of up to 468 pages.

**Response 231:** These documents are all specific to the LNP evidentiary hearing, and detail the commentor's (as an intervenor in that hearing) concerns regarding what they contend are inadequacies in portions of the *Final LNP EIS*. However, the commentor has not provided any information directly relating these documents to the *King Road EIS*. As described in responses 226, 227, and 230, assertions made by commentors about cumulative impacts are not supported, as these impacts have been addressed in

the *King Road EIS*. For these reasons, this comment is specific only to the *LNP EIS* and is outside the scope of the *King Road EIS*.

**Comment 232 Received 3/14/2013:** These commentors assert their opinion that recent sinkholes along fractures, linked to mines, have caused deaths and private property damage due to aquifer depletion from existing mining and groundwater withdrawals. The commentors state that neither the *LNP EIS* nor the *King Road EIS* took a hard look at how groundwater alterations from those projects would affect the surrounding vicinities or the regional Floridan Aquifer System or the other adverse environmental impacts that would occur from the damage to the aquifer. Nor did those documents adequately take into consideration the potential for causing lethal sinkhole damage. The commentors conclude that an SEIS is required to take a hard look at all of these cumulative impacts.

**Response 232:** See response 227. The groundwater models included water loss through lake evaporation and pumping for mining processes, as described in Appendix D of the EIS. Modeling indicates impacts from groundwater drawdown at the proposed Tarmac King Road Limestone Mine (see Section 4.2.2) are expected to be minimal and the cumulative impacts from the Tarmac King Road Limestone Mine and the other activities described by the commentor were accounted for in Section 4.17. The largest change in average local groundwater tables would be  $\pm 0.3$  feet, and this impact would extend only relatively short distances from the project site, as depicted in Figures 4–4 and 4–5. This minimal alteration affecting a minute portion of the Floridan Aquifer is not expected to cause sinkholes to form.

**Comment 233 Received 3/31/2013:** This comment provides information the commentors assert refutes part of the 11/01/2012 testimony of a witness in the ASLB evidentiary hearing for the LNP. The commentors state that the information shows the SWFWMD cannot be relied upon to protect wetlands and enforce relevant laws, conditions, and other protective measures. The commentors also state that significant direct, indirect, and cumulative impacts have already been suffered by the regional Floridan Aquifer System in Hillsborough County near a ranch and dwellings, and this is the same aquifer that would be harmed by the proposed LNP and Tarmac Mine and any additional mining within the SWFWMD and surrounding water management district boundaries. Information on impacts the commentors contend have occurred from phosphate mining, and on interactions with SWFWMD staff related to those impacts is also provided in the form of attached letters, photographs, and affidavits.

**Response 233:** The comment is related to witness testimony in the ASLB evidentiary hearing for the *LNP EIS*, and to the commentors' concerns about SWFWMD and activities at certain phosphate mines. The *King Road EIS* does not rely on that witness testimony. The commentor expresses general opposition to the proposed Tarmac mine but does not detail that opposition to their concerns about these other projects, other than to state the Tarmac mine would supply construction materials for the LNP. This assertion regarding LNP construction is addressed in response 26 of this appendix. For these reasons, this comment is specific only to these other projects and is outside the scope of the *King Road EIS*.

**Comment 234 Received 4/8/2013:** This comment is mostly a duplicate of Comment 233, with additional information on impacts the commentors assert have occurred at specific locations from phosphate mining, and on interactions with SWFWMD staff related to those impacts.

**Response 234:** See response 233.

**Comment 235 Received 4/23/2013:** This comment provides information concerning part of the 10/31/2012 testimony of a witness in the ASLB evidentiary hearing for the LNP. The commentor submitted these documents to each of the USACE EIS project managers as new information relevant to both the *King Road EIS* and the *LNP EIS*. The comment states that the winter 2003/2004 USGS color infrared imagery used as a base map for figures of the georectified lineaments was selected for the 2012 publication entitled "Preferential Groundwater Flow Pathways and Hydroperiod Alterations Indicated by Georectified Lineaments and Sinkholes at Proposed Karst Nuclear Power Plant and Mine Sites" because it enhances the distinction between upland and wetland vegetation. The comment advises that recent color infrared imagery is not suited for detection of the lineaments mapped decades prior to base map color infrared imagery for reasons described in the 2012 publication and peer-reviewed publications cited in the 2012 publication. The commentor states that to see the previously mapped lineaments one would have to rely on someone trained in this type of remote sensing, using the same aerial photographs

and mosaic of satellite imagery used to map those lineaments and appropriate stereoscopic and other equipment, not just the naked eye of an untrained person.

The commentor states it is vital that the USACE understand clearly the genesis of the lines on the maps in question, and that the lines represent fractures identified and verified by various experts in mapping those types of remotely sensed features (e.g., geologists Vernon, Faulkner, and remote sensing staff of the FDOT). The commentor also considers it vital that the USACE understand those geologic features cannot be discerned by people lacking the specialized training, equipment, and the historic aerial photographs and satellite imagery used to map those geologic features in 1951 and 1973.

**Response 235:** The comment is related to witness testimony in the ASLB evidentiary hearing for the *LNP EIS*. The commentor uses information provided by a co-author of the 2012 study. That information is intended to clarify testimony from the ASLB evidentiary hearing by one of the other co-authors of the study. The primary focus of the comment is that the presence of fractures cannot be determined by persons lacking the training, equipment, and photographic data. This appears to address the findings of the ASLB judges who, in their March 26, 2013, Partial Initial Decision, rejected the Intervenor's assertion that evidence of photolinears or lineaments shows the existence of conduits or preferential pathways for groundwater flow in and around the proposed LNP site. As noted previously, the *King Road EIS* does not rely on that LNP witness testimony, and response 227 of this document describes how the *King Road EIS* considered karstification and fracturing in its analyses. For these reasons, this comment is specific to the LNP project and is outside the scope of the *King Road EIS*.

**Comment 236 Received 5/31/2013:** This comment provides information on three sinkholes associated with what the commentor asserts are fractures that extend to and through one cluster of active mines evaluated in the USACE's *Areawide Environmental Impact Statement on Phosphate Mining in the Central Florida Phosphate District (Phosphate AEIS)*. The commentor submitted these documents to each of the USACE EIS project managers as new information relevant to the *King Road EIS*, the *LNP EIS*, and the *Phosphate AEIS*. The comments are critical of the USACE for what the commentor feels was the exclusion of information from the *Phosphate AEIS*, that there were contradictions in deadlines for commenting on the *Phosphate AEIS*, the comment period was insufficient for the *Phosphate AEIS*, and that the information provided on phosphate mining impacts supports the commentor's conclusion that either a supplemental *Phosphate AEIS* is required, or no additional phosphate mining should be permitted because of the extensive, irreversible cumulative damage that has already occurred. Portions of comments submitted to the USACE in March 2013 (comment 232) were also resubmitted.

**Response 236:** As described in its summary, the comment is specific to the USACE's *Phosphate AEIS* and is outside the scope of the *King Road EIS*.

**Comment 237 Received 6/04/2013:** This comment focuses primarily on the USACE's *Phosphate AEIS*. The commentor submitted this set of documents to each of the USACE EIS project managers as new information relevant to the *King Road EIS*, the *LNP EIS*, and the *Phosphate AEIS*. The comment includes a request for an extension of the comment period for the *Phosphate AEIS*. The commentor noted an earlier comment provided on 5/31/13 that included comments in nine listed topic areas; these are all specific to the USACE's *Phosphate AEIS*. Twenty-six additional bulleted items in the comment letter and seven attachments referenced concerns the commentor has over modeling used in the *Phosphate AEIS*, the *Phosphate AEIS* study area, what the commentor feels are omissions in the *Phosphate AEIS*, and water pollution and other impacts the commentor asserts would occur from phosphate mining evaluated in *Phosphate AEIS* but that were not adequately evaluated in the *Phosphate AEIS*. The commentor also provided documents it previously provided to the USACE in earlier comments, including documents related to the *LNP EIS*. The comment included an assertion that the USACE segmented and arbitrarily restricted a study area/affected environment due to failure to consider impacts on the Floridan Aquifer System. The commentor stated that the proposed LNP and Tarmac mine projects would reduce water in the same aquifer system that contributes to the Suwannee River from which it has been proposed water be diverted to the greater Tampa metropolitan area. The commentor states that current phosphate mining in the study area used in the *Phosphate AEIS* has irreversibly lowered the aquifer level. Correspondence noting that none of the editions of "Springs of Florida" have any flow information for Big King Springs, Little King Springs, or any King Springs in Levy County was

also included in the comment. The comment concludes by stating that a supplemental *Phosphate AEIS* is required to resolve what the commentor feels are insufficiencies of the *Phosphate AEIS*.

**Response 237:** Comments specific to the USACE's *Phosphate AEIS* are outside the scope of the *King Road EIS*. Regarding the comments on impacts on the Floridan Aquifer, the *King Road EIS* describes the regional hydrogeology, including the Floridan Aquifer, in Section 3.1.2.1. The groundwater models in the *King Road EIS* included water loss through lake evaporation and pumping for mining processes, as described in Appendix D of the EIS. Flow information for Big King Spring, Little King Spring, or other King Springs in Levy County was not necessary for calculating groundwater models. Modeling indicates impacts from groundwater drawdown at the proposed Tarmac King Road Limestone Mine (see Section 4.2.2) are expected to be minimal. The largest change in average local groundwater tables would be  $\pm 0.3$  feet, and this impact would extend only relatively short distances from the project site, as depicted in Figures 4-4 and 4-5. The boundaries chosen for the *King Road EIS* cumulative impact analysis are explained in Section 4.17. The area evaluated in the *Phosphate AEIS* is outside of this area of analysis. No appreciable cumulative impact on groundwater levels from the proposed mine site in conjunction with other projects is expected, as discussed in Section 4.17.

I.21 COMMENT DOCUMENTS

I.21.1 Public Comment Forms



Draft Tarmac King Road Limestone Mine  
Environmental Impact Statement

.....  
Comment Form

Name: Jeanne Schodde

Organization: \_\_\_\_\_

Title: \_\_\_\_\_

Home Organization Address (circle one): \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Email address: \_\_\_\_\_

Comments: (Feel free to use additional paper if necessary to complete your comments.)

National Geographic did a study on the world's top supply and listed this area as third world in the world. I was told that Tarmac had so much mineral already that our voice won't be listen to. We are standing as a community to say no to Tarmac. Will they listen? Who will do as the public say? We say no to Tarmac.

There are several ways to provide comments on the Draft EIS:

- Attend the public meeting on May 31, 2012 and give your oral comments.
- Return this comment form to the registration desk at the public meeting.
- Mail this comment form to Mr. Edward P. Sarfert, USACE, Regulatory Division, 41 North Jefferson St., Suite 301, Pensacola, FL 32502-5794.
- Telephone 850-439-9533 or email: [edward.p.sarfert@usace.army.mil](mailto:edward.p.sarfert@usace.army.mil)
- Comment via the website: [www.kingroadeis.com](http://www.kingroadeis.com).

**COMMENTS MUST BE RECEIVED BY JULY 11, 2012**

## I.21.2 Comments from Website

### Lisa Algieri, City Manager City of Dunnellon

Comment: CITY OF DUNNELLON 20750 RIVER DRIVE DUNNELLON , FLORIDA 33431 (352) 465-8500 FAX (352) 465-8505 Via email & website July 11 , 2012 Mr. Edward Sarfert, USACE Regulatory Division 41 North Jefferson St., Suite 301 Pensacola, FL 32502-5794 Dear Mr. Sarfert: The City of Dunnellon is a small city located in southwest Marion County along State Hwy 41 and County Road 40. Population within the City is 1,733 and approximately 40,000 in the surrounding area. Dunnellon is a bedroom community to Ocala and home to many retirees. The local economy is dependent on eco-tourism. The Rainbow River and Withlacoochee River converge in Dunnellon. Over 200,000 visitors a year visit these rivers to enjoy fishing, canoeing and tubing. In 2004, Dunnellon's citizens developed a Strategic Vision for their city. The primary goal is to create and support a walkable, pedestrian friendly community that is sustainable. In support of the vision the City Council has installed red light cameras resulting in slower traffic. The City Council has also adopted a Bicycle/Pedestrian Master Plan based on citizen input. Additionally, the City Council has established a Streetscaping Committee to begin improvements on Pennsylvania Avenue (CR 484). The proposed Tarmac King Road Limestone Mine raises concerns for the City of Dunnellon. In Section 3.14.5 of the Draft Environmental Impact Statement (DEIS) it is reported that the distribution of crushed rock by truck would cover a 70 mile radius. The City of Dunnellon is located within this 70 mile radius. Heavy truck traffic as proposed by the mine would be devastating to the City of Dunnellon. County Road 40 is the west entrance into Dunnellon. Although it is noted in Section 4.15.2.2.1 of the DEIS that no truck traffic was assumed to travel on CR 40 because it currently has a weight restriction of 10,000 pounds, the City is concerned that the weight limit will be increased allowing trucks to use the road. When one reads the DEIS there is an implication that weight limits will be increased on CR 40, since it is noted that the existing weight restrictions are "current". If CR 40 cannot be used, then why did Links and Associates study it for capacity and what routes will trucks use to get to Marion County? If the weight limits are increased allowing trucks to use CR 40 then the DEIS does not follow the NEPA. Truck traffic in Dunnellon would adversely impact two school zones, a National Register Historic District, property values and the pedestrian/bicycle friendly environment of Dunnellon. Dunnellon Middle School is located near CR 40 as well as a private school. Truck traffic would interfere with school traffic and children walking and bicycling to school. This would create a safety hazard for school children in the area. Dunnellon's Historic District is accessed by a section of CR 40 which also leads downtown. The district, listed on the National Register of Historic Places, was originally residential and is now a mix of residential and commercial space. The corridor also hosts several annual community-wide events such as Boomtown Days in the spring and Jazz Up Dunnellon in the fall. The addition of heavy truck traffic would be a negative impact to this district. The DEIS does not address the historic and therefore does not follow the National Historic Preservation Act of 1966. Property values along the truck route will decrease as truck traffic increases. Heavy truck traffic generates noise, dust and fumes. A major study of noise costs conducted for the 1982 Federal Cost Allocation Study "assumed a 0.4 percent decrease in the value of a housing unit for each dBA (Leq) increase over a threshold value of 55 dBA." (TranSafety).<sup>1</sup> The DEIS did not address the loss of property values. Dunnellon is a bicycle/pedestrian friendly community. The city promotes a safe environment for its pedestrians and bicyclists as demonstrated in the master planning and street improvements. Heavy truck traffic is hazardous to pedestrians and bicyclists. The noise, fumes and dust are counterproductive to the safe environment the city is achieving. Routing trucks through Dunnellon would be devastating to the quality of life now enjoyed by its citizens. Expertise in preparing the DEIS as listed in Chapter 9 does not include professionals in historic preservation and property appraisal. The DEIS does not address the adverse impacts to Dunnellon which is within the 70 mile radius nor does it provide mitigation to those impacts. The final EIS needs to address the adverse impacts to Dunnellon and provide mitigation for the impacted school zones, historic district, loss of property value and loss of quality of life for all the citizens of Dunnellon. Lisa Algier: City Manager 1  
<http://www.usroads.com/journals/p/rcj/9710/re971004.htm>

**Betty Berger**

Comment: PLEASE use "No Action Alternative" 2.1.3. Since we spoke Cedar Key , Florida has had saltwater entering their drinking water. We draw from the same Floridan Aquifer and Swiftmud says "it is fed only by rainfall" AND IT'S NOT RAINING! We MUST NOT permit Tarmac to drill a rock mine under Special Exception, as they are not zoned for this. Even their permitted consumptive use WILL draw too much from the aquifer - let alone their anticipated 22 mil.gal.water/day to wash their rock for 100 years. Their first mine pit is at the headwaters of Bone Slough which will stop ALL water from flowing across Levy County. Further info to be sent by mail.

**J. Beverly**

Comment: I write to express opposition to the proposed destructive rock mine in the heart of Florida's Nature Coast. This could have a serious negative impact on the lives and the communities in the area: from blasting and traffic to panther and black bear habitat damage. But more importantly the effect of this upon the groundwater in Levy County concerns me the most. Additionally, the mining companys preferred alternative would include damage of up to 3,000 acres of wetlands. Please do not allow this mining operation to go forward. Thank you.

**Dr. Dale R. Jackson**  
**Florida State University**

Comment: From the standpoint of ecosystem conservation and wildlife protection, construction of such a massive limerock mine will have massive negative consequences. This should be obvious to any biologist. The Gulf Hammock region has been severely degraded for years by silvicultural activities, but nonetheless holds the promise of restoration. A limerock mine will destroy this promise and possible future, and its potential role in supporting even common species as well as rare species. No action (no mine) is by far the preferred alternative.

**Nancy J. Kost**  
**Citrus County Audubon Society**

[www.citruscountyaudubon.com](http://www.citruscountyaudubon.com)

June 24, 2012

Mr. Edward Sarfert

U. S. Army Corps of Engineers Regulatory Division

41 North Jefferson Street, Suite 301

Pensacola, FL 32502-5794

Dear Mr. Sarfert:

On behalf of the Board of Directors and members of the Citrus County Audubon Society, I am commenting on the Environmental Impact Statement for the proposed Tarmac King Road Limestone Mine in Levy County, Florida. We do not support this project and urge its rejection. Our major concerns are:

1. The project would require the destruction of considerable pristine wetlands in this area of Florida. We realize a mitigation area is planned, but natural wetlands are irreplaceable. (Craig Pittman and Matthew Waite, St. Petersburg Times, Special Report - Vanishing Wetlands, "Mitigated wetlands usually fail," December 17, 2006.
2. It is likely a large storm will occur some time during the 100 years of the mine's existence, making salt water intrusion from such a storm a distinct probability. Flooding from this type of storm surge could breach the mine's berm and introduce salt water into the aquifer. Salt water intrusion is already a problem in wells in Cedar Key, Levy County (Mark Scohier and Lou Elliott Jones, Cedar Key Wells Suffer Salt Water Intrusion, Citrus County Chronicle, June 21, 2012).
3. The World Health Organization has found that diesel pollution causes cancer (Donald McNeil, Jr., New York Times, June 12, 2012). Hundreds of diesel powered heavy trucks going to and from the mine each day will pose a health hazard to area residents who will have to inhale these fumes daily. Truck noise and dust are of additional concern, and heavily loaded trucks will cause damage to roads and increase the number of accidents. Who will pay for the damage to our health, roads and safety?
4. Sinkholes can form as a result of vibration and withdrawal of large amounts of water from the aquifer. The Florida 'Nature Coast' is already prone to sinkholes and a mine of this magnitude will further exacerbate this danger.
5. The mine would create a handful of meaningful jobs. The real wealth garnered from this environmentally destructive operation will benefit the foreign owner.
6. Our aquifer is already stressed and impaired from over-pumping, pollution and drought, and this mine will draw it down an additional 22 million gallons of water a day.
7. There are now statistics showing that importing limestone would be less expensive than the cost to produce limestone from the Levy County mine.
8. Tourism is a major economic factor on the Nature Coast. The noise, pollution, and truck traffic can only harm our currently thriving tourist industries.

Citrus County Audubon Society will only support Alternate 1 - no mining.

Sincerely, Nancy J. Kost

Conservation Coordinator Citrus County Audubon Society

352/628-0698

[nkost@tampabay.rr.com](mailto:nkost@tampabay.rr.com)

**Bruce Morgan**

Comment: You have heard the arguments before. This ill considered project will lower the water table and promote salt water intrusion. It will sever a critically important habitat corridor for both listed and unlisted wildlife species, particularly bears. Most importantly, this project is not needed. If an additional source of inexpensive road bed material becomes available it will encourage inappropriate road building and sprawl development throughout the Nature Coast region. Please deny this permit.

**Neil Sawyer**

Comment: Mr. Sarfert - This area, as with many parts of Florida, is having serious water shortage issues, and they will only get worse! Lower stream, lake, and sub-surface water levels are already a problem, and projected to get worse. We cannot afford the Tarmac mine, in terms of water usage. Please use your influence to stop this demise of west Florida, Sincerely, Neil Sawyer

**Stephen Ulman**

Comment: Hi, my name is Stephen. I am a native-born Floridian, UF graduate, and concerned citizen. I must say, ripping up the State of Florida for profit is a terrible idea. The fragile ecosystems that exist no where else in the world have already suffered enough by the wanton destruction of developers to build housing stock that sits unoccupied across the state. If this company wants to turn a profit, why not develop a way to reclaim aggregates from existing structures and use it to build more compact and denser cities across the state that are leaner and use less resources. Pulling up the limestone that acts as a natural filter for the water resources is suicide. If there are no sources for fresh water, no one will be able to live in the new homes and drive on the new roads this aggregate will go into building. It is no secret that the north part of FL has the water the south part relies on to exist in its present form. The impact on the environment would be egregious and criminal. This is a short-sighted plan that would only benefit a small group of investors and not the people who actually live, work, or recreate in Florida. I encourage you to make the right decision and stand up to the forces of destruction that want to turn Florida into a golf course and pave paradise.

### I.21.3 Comments from Email

#### J. McCarthy

Dear Mr. Sarfert,

RE: Comments on Draft Environmental Impact Statement (DEIS) of Proposed Tarmac American LLC's ("Tarmac" aka "King Road")

The attached incomplete compilation of short comments relate to various issues evaluated in the subject DEIS that we reviewed. I regret my comments are incomplete, and lack refinement but my ad hoc schedule has turned out to be about as far out of synch with the review schedule as is possible. In contrast to prior experiences with such, I was impressed with the quality of DEIS package. I must compliment those individuals for, what is in my limited experience, unprecedented results.

Thank you for the opportunity to comment.

J McCarthy

Subject: Comments on Draft Environmental Impact Statement (DEIS) of Proposed Tarmac American LLC's ("Tarmac" aka "King Road") Levy County, Florida

#### Comments on Water Related Concerns

##### Groundwater Flow Models

Contract modeling personnel manipulate assigned input values for variables used in Numeric Finite Difference Models until the results generated replicate, within acceptable tolerances, limited, pre-mine groundwater measurements (e.g., groundwater elevation) at the site to response to extractive operations under a variety of conditions. The DEIS commentaries describe details of more significant models including a refreshingly candid, clearly stated, comprehensive summaries of the limitations and intended model applications. Limited pre-mining, site-specific measurements of hydrologic is one of the significant limits on refining model calibration during early stages development.

The quality of model-based assessment depends on the quality, scale and accuracy of the conceptual site model (CSM) on which the model is based. The Groundwater Flow Model developed for the DEIS by SAI is assumed to be frozen in an early stage of the calibration process. The following issues might be considered in the context of refining the CSM or enhancing flow model performance, if a future decision to approve a mining option results in initiating mine operations:

- Blasting operations induce fractures in the surrounding rocks, significantly altering hydraulic conductivity ( $K$ ) values. In general, blasting alters  $K$  values in surrounding formations that enhance groundwater flow potential in an extended area surrounding the quarry pit. Blasting also results in induced fractures in the quarry bottom that can extend tens of feet below the base of excavation. This enhances potential for vertical fluid movement because significant increases in  $K_v$ .

- Consider using rainfall data collected at the SWFWMD's Bird Ck gauging site located in SW Levy Co., approximately 7mi southwest of the Tarmac mine lease. Groundwater model estimates of recharge are very sensitive to changes in rainfall totals and improved rainfall data sets should be incorporated into the model as early as possible. Bird Ck data sets appear to be complete for 8 calendar years (1/1/2004 through 1/1/2011) and are assumed to more accurately reflect rainfall at the King Rd mine site. Bird Ck. is probably the only gauge close to the mine site capable of documenting characteristics of rainfall events at the coast. Compared with other rainfall data sources used by various contractors cited in the DEIS, average annual rainfall totals collected at the Bird Ck site appear to be significantly lower than data sets collected at other locations cited in the DEIS. tertiary porosity (e.g., fractures and karst enhanced fractures). I believe the core study was programed for sampling above -50 ft. bls.

#### Other Water Model that Matter Less

- Steady state numeric models based on assigning a single, **average annual cumulative total** numerical values to transient cyclic hydrologic elements, like rainfall and ET, tend to be used in numerical modeling exercises to generate statistics for things like assigning values to elements of a tabulated water budget, like Table 8; or determining values to assign elements of the derived flow diagram on Fig.23 (DEIS, vol. II, Appendix B). The output of such models plucked out of the context the intent of the models tend to be the favored by elements of society predisposed to statistical abuse crimes (e.g., land user lawyers and politician/developers who apparently appreciate the humorous side of "proving" incorrect conclusions by misuse of accurate data. More than once I've heard arguments along the lines of:

" our area has sufficient water supply because rainfall is x/yr and losses from E/ET are x-10/yr therefore we have an avg. annual water surplus of 10 units per year!" A

A simple alternative, would use assign the normal range of daily water consumption range for each project element rather than a calculated annual daily average. An even better alternative, would be construct Monthly Water Budget using average monthly rainfall data see attached figure lifted from Fernald and Purdum eds., (1998, p.34).

#### Water Quality

A major oversight in the DEIS is it that **does not employ the most appropriate geochemical water model** for assessing potentially significant water quality changes that I expect to occur in the immediate vicinity of active mining less within a year following start-up of "deep," high-volume rates of extraction and aggregate processing on the proposed property. The entire upper Floridian aquifer above Middle Confining Unit which occurs about 500' below the top of saturated zone marking the top of the upper Floridian. I suspect only about 80-100 ft of potable ground water exists over most of the mine lease. Below the potable upper zone..... turn overlies about 400' thick wedge of

Time is up ... however, I recommend option 1 - NO MINING, and my alternate option, 7

**I.21.4 Comment Letters**

*Withlacoochee Area Residents, Inc.  
PO Box 350  
Inglis, Florida 34449-0350*

31 May 2012

Department of the Army  
Jacksonville District Corps of Engineers  
Pensacola Regulatory Office  
41 N. Jefferson St., Suite 301  
Pensacola, FL 32502

Subject: Tarmac King Road Mine DEIS Public Hearing;  
WAR, Inc. presentation summary

Our presentation this evening will be brief due to incomplete review. W.A.R., Inc. (WAR) will provide expanded written comment by published deadline.

The record for this application makes clear WAR is opposed to locating a large scale mine in Gulf Hammock. The many reasons for such objection are potential impacts to water resources, wetlands destruction, loss of habitat, corruption of existing economic endeavors and incompatibility with adjacent land uses and activities. A project life of 100-110 years suggests enormous uncertainty in all projections and assumptions under current review.

The project is vulnerable to tropical storm impacts due to low project area elevations and projections of disproportionately high storm surge levels due to coastal morphology. During the period of record (1851 to present) the region of Crystal River to Cedar Key has been impacted by approximately 22 tropical systems as Tropical Storms through CAT 3 inclusive; an average of one every 7.2 years.

Storms with intensity levels CAT 3 or greater threaten the integrity of Alternatives in the east and northeast portions of the proposed project area. All Category storms present hazards to remaining Alternatives. Berm structures intended to segregate sensitive wetlands and streams from the project area are vulnerable to internal and external wave action. We doubt earthen berm structures will prevail against such

onslaught. In comparison, engineered concrete and steel structures failed to protect the city of New Orleans during Hurricane Katrina's landfall with CAT 3 intensity. The selection of a preferred alternative based on tropical storm impacts should be predicated on Category 3 or greater intensity.

The Draft suggests uncertainty in forecast of sea level rise (SLR) ranging from 0' to 5.7'. In worst case it will impinge on the southwestern portions of the project area within 85 years. This will require reevaluation of metrics related to hydrology and protection against tropical storm systems. Lacking definitive determination we suggest that selection of a preferred alternative should be tempered by worst case scenarios regarding SLR.

Protection of habitat and water resources from project impacts during storm events appears predicated on berm heights in the minimum range of 19' NGVD. The applicant's ability to comply with such permit provisions is legally clouded due to provisions of the Levy County Code and the measure of terrain elevations in the western portion of the Alternative 2 project area.

**Levy County Land Development Code**

**Sec. 50-719** (redacted)

**II. Special exceptions for major mining operations; criteria, standards and conditions.**

(D)(2) *Buffering standards.* When required by the board of county commissioners for any major mining operation, the following buffer standards shall apply:

a. *Length.* The buffer shall be of sufficient length so as to shield mining activity from incompatible land uses.

e. *Berms.* The following are requirements for berms where utilized to augment vegetative buffers:

i) The berm shall generally run parallel to, and no closer than 50 feet from the property line. The above two standards may be modified where there are impeding physical features, such as wetlands or other such features.

ii) The berm shall be built to the height necessary **(not to exceed ten feet above the natural surface of the ground)** to shield mining activity from the property line (excluding booms, towers, stockpiles or other similar items which extend above the buffer) so that it cannot be viewed through the buffer from adjoining properties when viewed from the property line. **The berm shall not be of uniform height for its length, but shall undulate at varying heights at or below the ten-foot maximum set herein,** while still providing the shielding from view of adjoining properties from the property line.

In examination of need and alternatives for this project consider that because a mine does not have FDOT certification does not mean that it cannot be obtained. An

example is found in the Holcim US mine south of the Cross Florida Barge Canal which exports product to Alabama via barge. The company does not process limerock on site. As a result of this business decision there has been no compelling need to make application for FDOT certification. It does not mean the Holcim US product fails to meet standards. While material certification is a valid consideration, we believe a more proper metric includes gross market area availability of raw supply rather than perception of supplies artificially influenced by business decisions.

The Holcim US business model may be subject to alteration due to Florida's Site Certification for the Progress Energy Levy Co. power plants. As the first refueling cycle occurs at that facility, the State's Conditions of Certification require Progress Energy to decommission two of its coal fired power generators. With that, transportation synergy between PEF and Holcim US is at risk. This may provide motive for modification of the business plan. The Corps should be aware that the mine located on the north shore of the Barge Canal previously held FDOT certification under the name of Independent Aggregates.

WAR supports Alternative 1. We perceive no reasonable assurance of protection of natural resources within and peripheral to the proposed project area in context of project life set forth in Alternative 2. We note Alternative 2 produced insufficient UMAM lift to justify its selection as a preferred alternative.

Alternatives 3-8 present different vulnerabilities to tropical storm impact and different measures of direct impact. Should the Corps determine a preferred alternative within that subset, it is reasonable to limit the selection to the single alternative which posits the least direct impact and minimum indirect impact potential. Because of the uncertainty of projections extending into the next century it is our considered opinion that Alternative 7 presents as the only logical choice to address those concerns.

Thank you for your time and courtesy.

For WAR, Inc





## Save the Manatee® Club

*The Voice For Manatees Since 1981*

Ed Sarfert  
Jacksonville District Corps of Engineers  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502

June 22, 2012

RE: Tarmac King Road Limestone Mine (No. SAJ-2007-05537-IP-EPS) and Environmental Impact Statement

Dear Mr. Sarfert,

Save the Manatee Club has reviewed the permit application (No. SAJ-2007-05537-IP-EPS) and Draft Environmental Impact Statement (EIS) for the Tarmac King Road Limestone Mine. The applicant proposes to construct a limestone mine on approximately 3,900 acres in Levy County to be operated over the next 100 years. Due to its nature and location, this project has the potential to cause serious negative impacts to groundwater quality, surface waters, and wetlands, and to be susceptible to flooding from hurricane storm surge and sea level rise. Therefore, we support the "No Action" alternative and recommend that the Corps deny the issuance of this permit application.

In addition to providing a detailed assessment of the environmental impacts this project may cause, the Environmental Impact Statement also presented eight proposed alternative projects with varying degrees of impact to the environment. After reviewing the project details and alternatives in the EIS, we have several concerns about how this project will affect environmental conditions both on the project site and on surrounding areas. Our concerns include the following:

- **Groundwater quality:** The impacts to groundwater quality would originate from various operations of the mine, such as blasting, rock removal, and refilling of excavated quarries. Such activities may, as referenced on p. 17 of the EIS, increase fine sediment concentration, alter the geochemistry of the aquifer, and increase the risk of spills. These events would affect waters not only within the project site, but also offsite since affected waters travel downstream. In addition, the EIS states that the level of impact the project may have on groundwater quality would be independent of which alternative was chosen, suggesting that it is the entire operation of the mine itself that needs to be reviewed, rather than the different alternatives. While the EIS states that potential impacts could be monitored and mitigated, we feel that the mine activities present too great a risk to groundwater quality and should not be permitted.
- **Surface waters:** The EIS states that all of the proposed alternatives have the potential to impact surface waters, both within onsite streams and constructed lakes and offsite within the watershed. As the waters from the project site will drain into Waccasassa Bay and the Big Bend Seagrass Aquatic Preserve, any impact to surface water will also have a negative effect on manatees, their aquatic habitat, and their primary food resource- seagrass. While the disturbed surface waters are intended to be restored after the mining is completed, which is presented as a method to minimize impact to on and offsite surface waters, mining will not be completed until after 100 years, by which time irreversible damage is likely to have been done.

Furthermore, the status of our agencies to enforce this future mandate 100 years from now is unknown.

- Wetlands: Damages to wetlands will be unavoidable under any of the action alternatives. While the acreage of affected wetlands varies in alternatives 2 through 8, a minimum of 720 acres of wetlands will be directly impacted (alternative 7), with a maximum of almost 2,070 acres impacted (alternative 2). While up to 4,630 acres of wetlands are proposed for mitigation to offset these damages, plans should be devised to minimize damages from the outset, allowing mitigation only as a last resort and closely scrutinizing the ecological value of what is being lost compared to the ecological value of what will be gained- and ensuring that mitigation is properly monitored to ensure success. Mitigation is not solely about numerical acreage, but about the functionality of the ecosystem affected. The proposed impact to wetlands, even the most minimal proposed impact of 720 acres, is unacceptable and should not be permitted.
- Flooding: Based on the location of this project, both the mining and mitigation sites would be susceptible to flooding from hurricane storm surge and sea level rise. In a tropical storm, the entire mitigation site would be flooded. In a Category 1-2 storm, the western half of the mining site would be flooded, and the entire mining site would be flooded from a Category 3-5 storm. As tropical storms are not uncommon and climate models predict more frequent severe storm events in the future, the mitigation site could be flooded much more easily and often than the mining site. If this occurred, the damage to the wetlands incurred through mining activities would not be adequately mitigated for and the ecological value of the mitigation would decrease. In addition to discrete storm events that will create surges of water into the system, predicted levels of sea level rise stand to cause sustained increases in water levels that will run the risk of flooding the mining site for several alternative actions. As with the storm surge, the mitigation site would also be flooded more quickly by sea level rise than any portion of the mining site, again reducing or eliminating any conservation benefits observed as a result of mitigation.

Although the EIS has provided a detailed explanation of this project's potential impacts to the surrounding environment, it is very difficult to predict the full level of impact this project may have over the 100 year period during which the mine would be operational. Because of this uncertainty, as well as the concerns listed above, we feel that Alternative 1, "No Action", is the best choice to protect the environment and the water supply. However, should a compromise be necessary and a decision from Alternative 2-8 must be made, we would prefer to see Alternative 7 selected. This alternative would have the lowest direct impact to wetlands, the highest functional gain of wetlands after mitigation, and the lowest risk of flooding as the site is the furthest east of Alternative 2-8.

Thank you for your consideration of our concerns and recommendations.

Sincerely,



Courtney Edwards  
Staff Biologist

*Withlacoochee Area Residents, Inc.  
PO Box 350  
Inglis, Florida 34449-0350*

6 July 2012

Department of the Army  
Jacksonville District Corps of Engineers  
Pensacola Regulatory Office  
41 N. Jefferson St., Suite 301  
Pensacola, FL 32502

Subject: W.A.R., Inc. comments on Tarmac King Road Mine DEIS

The following information is provided to supplement comments and written summary of same as presented to the USACE (Corps) on 31 May 2012 at the Inglis Community Center regarding the subject review. The summary of the presentation is provided as **Attachment A**. Withlacoochee Area Residents, Inc (WAR) has been directly involved with this process since the winter of 2008.

Reference material is supplied as an attachment to this document or by reference to the DEIS Volume, text page, tables or figure, etc. All page reference to documents provided by WAR, Inc is supplied in the form of Attachment ID and digital page number (D) if appropriate.

Discussion is provided on various topical issues and is followed by the organization's conclusions and recommendations to the Corps.

**Compatibility**

When different land use categories are identified and mapped by county authorities, consideration is given to compatibility of such benchmarks as noise, vibration, traffic density, air quality and hydrologic issues, etc. In this application review there are multiple conflicts which result from conversion of Forestry/Rural Residential category to heavy industrial use adjacent or in near proximity to residentially committed private properties. Local residents are deeply concerned about impacts to water resources, blasting vibration and substantial increase of truck traffic through the community of Inglis, Fl.

WAR finds no basis to contest Level of Service review regarding traffic volume increase. We are mindful however that such modification of traffic volume relating to truck transit of the US19/CR40 intersection in Inglis will result in higher risks to residents, increased traffic noise, road wear and so forth.

The Draft Environmental Impact Statement (DEIS) stipulates exceedance of Florida standards for peak particle velocity (PPV) due to blasting activity (Vol 1, Ch 4, Table 4-13) in the area of the "Deerhaven Campsites/Residence along Butler Road" beyond year 40 of the project in context of project alternatives. The closest residence is found 815' from the mining area. All alternatives except Alternatives 1 and 7 result in PPV exceedances beyond year 40, ranging from 117% to 138%.

Standards in use by the State of Florida as administered by the State Fire Marshal are codified in Chapter 552 FS. These standards are based on United States Bureau of Mines, Report of Investigations 8507, Appendix B - Alternative Blasting Level Criteria (Ch 552.30(2)FS). There are several observations we consider pertinent to this aspect of compatibility.

- 1) The standards were developed primarily in a dry environment, meaning the tests were, in part or whole, made in strata of limestone and other mineral strata that were not submerged, or beneath prevailing aquifer levels.
- 2) Elevated or stilt homes tend to magnify vibration levels in the living space floor areas.
- 3) Blast vibrations transmitted through aqueous karst geology are simultaneously transmitted by materials of different density such as limestone and water. These variables may confound attempts to minimize vibration impacts due to reinforcement of shock wave amplitude and/or frequency modification.
- 4) Residents in Inglis, Yankeetown and northwest Citrus County have experienced real property damage and decades of obnoxious vibration emanating from the Cemex Inglis Quarry even when proximity to the blast area exceeds 7,500'. The depth of the Cemex Quarry is approximately 74'. Charge quantities used in blasting for the mine are thought to range from 40,000 pounds to 65,000 pounds. Presumably Tarmac will use equal or greater charge weights. Requests by residents in Citrus County and Yankeetown for the Cemex mine operator to place seismic sensors in elevated home structures for vibration evaluation have been declined.
- 5) State law places the burden of proof on residential property owners when claims are filed for compensation due to damage to improvements/structures on real property resulting from blast vibration.

WAR generally finds that regulations used by the state to be ineffective in mitigation of complaints about blasting vibration and questionable in context of property damage mitigation. The DEIS Section 4.7.4.2 (pg 4-48 Vol 1) refers to "Tarmac 2010: Vol 1, Appendix 5" in this discussion in context of the objective of reducing vibrations to imperceptible levels. The experience of WAR members and residents in the community leads to a conclusion that such objectives cannot be achieved within far more distant offsets than 815'. As a result of this WAR finds support only for Alternatives 1 and 7.

### **Wetlands impact**

WAR finds the DEIS review of wetlands impact credible for Alternatives 1-8. The wetlands in question include stream flow paths, deep water ponds and other features of undisturbed wetland communities. In balance, such features are found predominately in the western and southern quadrants of the proposed project area (Vol 2, Append E, Fig 3 and Append G, Fig 2-4 & Map 4). Streams designated as no mine areas predominate in the eastern portion of the project area. Of the 8 Alternatives, only Alternatives 1 & 6 avoids impacts or potential impacts (direct and indirect) to streams. Alternative 7 minimizes impacts to wetlands in proportion to acreage destroyed.

WAR does not dispute findings in the UMAM technical analysis of the project area. We do not however agree that the loss of 720 - 2069 (Alternatives 7 and 2) acres of wetlands habitat can be compensated for by enhancement in the mitigation parcel. As noted in Table S-2 (Vol. 1, pg 18), Alternatives 2 and 5 result in net UMAM functional losses. Moreover, analysis by the Corps indicates the southwestern portion of the Alternative 2 project area and a very large portion of the mitigation parcel will be inundated prior to project completion. We realize no "mitigation" from submerged lands and characterize this as "mobile mitigation". Mitigation areas should be areas that are no more likely to flood than the areas they are "mitigating". Mitigation should be durable. With that said, it appears the minimum impact to wetlands is found in Alternatives 1 & 7 respectively.

Multiple references are made in the DEIS to the degraded state of wetlands in the project area due to silviculture operations. In context of habitat, WAR concurs with this assessment. The nature of silviculture operations is one of short term harvest cycles and as such there is little opportunity for establishment of hardwoods or other significant plant species which are significant in support of other biological communities.

In context of hydrologic function, we find no significant degradation directly attributable to silviculture operations other than impediments to flow as a result of roadways and deficient drainage architecture identified by the applicant. Therefore, we conclude the significance of silviculture impacts to be overstated and largely meaningless. The comparative metric at hand for the mining parcel of the project should not be what the land forms and biological communities were in 1940, but what they are today.

As noted by the team that prepared the Wetlands Delineation Report for the State of Florida, "this area has some of the most pristine wetlands in the nation if not the world."

### **Storm impacts**

The applicant acknowledges uncertainty on the subject of potential impacts which may result from tropical storm system landfall and attendant surge (Vol2, Appendix 4, Enrix, pg 4). This is based on unknown ramifications of sea water displacing lake pit water in a karst environment, thus becoming a component of ground water movement. Enrix acknowledges the probability of "some impact" but further discussion is not found in the DEIS.

WAR contends that uncertainty about the outcome of sea water loading of lake pits worthy of special focus. Potentiometric gradients presented by the applicant (DEIS) in analysis of ground water movement suggest movement to the west or southwest depending on location in the project area and aquifer stage. Private residents to the west and southwest of the project area are dependent upon private wells for water supply. The potential for contamination by salt water appears high in such scenarios. At present there is no significant chloride contamination in ground water within or without the project area.

WAR strongly suggests that tropical storm impacts are a significant risk to this project as probable direct and indirect factors. Three primary risks exist:

1. Introduction of sea water concentrations of chlorides into lake pits and subsequently to ground water resources that at present are not so contaminated.
2. Large scale disbursement of sediments from lake pits and corrupted berm structures into sensitive wetland areas within and adjacent to the project area.
3. Tropical storms may, depending on severity, affect the distribution of petroleum products or other pollutants used in project operations.

All Alternatives are vulnerable to tropical storm surge and internal lake pit wave action (DEIS Vol2, Appendix 4, Entrix, Fig 10 Surge Scores). This vulnerability extends to the entire project area incrementally through and inclusive of Category (CAT) 3 tropical storm systems. Only those parts of the proposed Alternative 2 project area in the eastern portion are somewhat protected at present from lower intensity storm surge (TS-CAT2) due to terrain elevation and current sea level elevation. These minimal protections are likely to be much reduced over 110 years as the shoreline moves eastward. The central and western portions of the project area are vulnerable to storms of CAT 2 and lesser intensities. The Entrix figure 10 Surge Scores is considered by this organization to be misleading in that it colors all impact areas under the banner of either TS or CAT 3 intensity. Doing so obscures geographic thresholds of potential impacts from various storm intensity categories. It is appropriate to view the project vulnerability to storm surge in context of intensity by TS Category as portrayed in DEIS Vol. 1, pg 3-6, Fig 3-3.

The applicant seeks a permit for approximately 110 years. It is reasonable to examine the tropical storm period of record for such a lengthy time and make determination of statistical probability for tropical storm impact to the project. Further, it is reasonable to ascertain probability of storm intensity upon landfall in order to evaluate risk. The proposed project life presents uncertainty of impact magnitude, yet the period of record (1851-present) raises statistical probability of tropical storm impact of some magnitude to the level of certainty. WAR finds no significant analysis of this issue in the volumes of the DEIS.

Data relevant to the discussion is found in the following NOAA web links. WAR acknowledges early data in these summaries do not have the fidelity of post 1950 data due to advancements in observation technology. Possible intensity and track inaccuracies in the early record do not belie the occurrence, or where the impacts were observed. Storm tracks are provided in graphic form for most of the period or record as **Attachment B** and as tabulated data in **Attachment C**.

<http://www.nhc.noaa.gov/pastall.shtml>

<http://www.aoml.noaa.gov/hrd/hurdat/ushurrlist.htm>

The period of record indicates in excess of 20 tropical storms of TS-CAT 2 intensity impacted the region. Further, two additional storms of CAT 3 intensity impacted the region during the same period. One of the latter, Hurricane Easy loitered in and around the Gulf Hammock region for a protracted period and deposited nearly 40" of rainfall in 24 hours and a total of over 45" for the event in the vicinity of Yankeetown. <http://www.srh.noaa.gov/images/tbw/paig/PresAmHurricane1950.pdf>

During permitting processes administered by the Bureau of Mining and Mineral Resources (FDEP) the applicant submitted internal wave run up calculations for lake pits in circumstances of sustained wind velocities of 110 mph (Saffir-Simpson CAT 2). Submitted to record by the applicant was a projection of lake pit peak wave heights of slightly less than 7' ([Attachment D, 2<sup>nd</sup> RAI response, November 2009, DEP21, D-pg 10 & 11](#)). Given such vigorous attack on earthen berm structures from within and noting such projected heights did not include the addition of rain deposition to the height of the water column, WAR finds expectation that such structures might survive intact to be without credibility.

WAR concludes that storms of CAT 3 intensity and greater are a distinct possibility worthy of consideration in development of the EIS. Probability of such impact appears likely but the record does not suggest certainty. However, the probability of direct and indirect impact from storm intensities of TS-CAT2 strength is certain. For such reasons we are of the opinion that detailed examination of risks associated with intensities TS -CAT 3 should be mandatory in this review.

Given that issuance of a permit for this project risks repeated exposure to storm surge throughout the project area by all tropical storm categories it is suggested the applicant provide mine lake wave run up calculation for CAT 3 peak winds as a minimum, to better understand potential risks. Such calculations should include moderate to worst case rainfall totals as additions to projected lake water elevations. The review should likewise provide basis for any expectation that earthen berm structures can withstand tropical storm impacts.

To understand the implications and probability of storm surge it is necessary to examine a great many variables. In addition to the previous reference to NOAA records, it is suggested that review of [Attachments E: \(Flood Insurance Study-FEMA\) and F: \(Storm Tides for the Gulf Coast of Florida-NOAA\)](#) be undertaken. The variables are complex. The interaction of tide, storm aspect, duration, intensity, land form etc. can, by mere chance, range from benign to disastrous. It is clear that onshore obstructions will modify wave action external to the project berms, but it is equally clear that such assaults cannot be discounted.

Because these issues are either not addressed by the applicant, or addressed in perfunctory fashion, WAR finds no reasonable assurance in assessment of need versus risks to jurisdictional wetlands, associated biological communities and water resources in context of all project alternatives except Alternative 1. No data is supplied which might project direct or indirect impacts resulting from tropical storms,

or which differentiate degrees of impact based on different Category intensities for such events. It is necessary that comprehensive evaluation of all risks attendant to this application be undertaken.

### **Sea Level Rise**

Examination of Sea Level Rise (SLR) by the Corps presents findings which posit substantial uncertainty due to proposed project life. The range of possible change presented in the DEIS is 0-5.7'. Factors which promote SLR include global warming and geological subsidence. In the region of Gulf Hammock we are fortunate to have expert review of local trends and resulting impacts. Various works ([Attachment G, Castaneda and Putz](#)) have evaluated the phenomena in and around Waccasassa Bay State Park and observed recent acceleration of the trend. Current SLR rates are in the range of 2mm - 2.2mm/year. It appears unlikely that increasing SLR trends will abate in the near term and WAR finds the DEIS upper projection of potential SLR to be conservative though credible for purposes of this review.

Additional discussion on SLR is found in the recently released "*Historic Topographic Sheets to Satellite Imagery: A Methodology for Evaluating Coastal Change in Florida's Big Bend Tidal Marsh*", Raabe, Streck, and Stumpf for USGS; June 2012.

Access to the document is found here: <http://pubs.usgs.gov/of/2002/of02-211/> and it will be provided by WAR upon request. File data for this document is large due to enclosed graphics.

Analysis by the Corps indicates the southwestern portion of the Alternative 2 project area and a very large portion of the mitigation parcel will be inundated prior to project completion. Such occurrence suggests profound uncertainty over the life span of the project in context of assumptions or conclusions developed by the applicant on topics of ground and surface hydrology, berm structure integrity, and tropical storm impact (direct and indirect).

Due to uncertainty attendant to this issue over the proposed term of the project, WAR finds no basis to support any project alternative which will be significantly influenced, directly or indirectly by SLR. WAR concludes that areas of the project alternatives at risk of impact from storm surge only in circumstance of CAT 3 storms, will be equally at risk from lesser intensity storms before the project life is complete. The applicant's intends to leave approximately 1,400 acres of open lake pits in the project area (Alternative 2). These lake pits are for the most part vulnerable to storm

intensities of TS - CAT 2 in present day circumstances and present greatest footprint in the western portion of Alternative 2. Risks based on scope of the project and magnitude of impact will increase with the passage of time. The risks will exist in perpetuity.

**Hydrology: water budgets**

The water budget calculations used by the applicant are considered inappropriate by WAR. The applicant relies on annual averages for Levy County (54.94") and Citrus County (54.12") (DEIS VOL 2 Ardaman Assoc. Table 1) in water budget calculations.

Due to the meteorological phenomena described as the "sea breeze front", rainfall on immediate coastal features in the region is substantially less than recorded by inshore rain gauges. See the following Web link for dialog:

<http://www.srh.noaa.gov/jetstream/ocean/seabreezes.htm>

This disparity is reflected in the DEIS (Vol. 1, 3.9.1.1, pg 3-66) by varying average rainfall in Tampa (47.52"), Inglis Lock (49.67") and Usher Tower (59.65"). Usher Tower's location relative to the Waccasassa River Basin and project area and rainfall record serves to illustrate the issue of sea breeze fronts quite well.

In 2008 the Florida Office of State Climatologist reported the annual average of rainfall at Cedar Key as 47.41". WAR submits **Attachment H (SWFWMD-Bird Creek)** as ten years of record for the Bird Creek Rain Gauge. The gauge is located near the end of County Road 40 on the Gulf Coast and within the town limits of Yankeetown. The early years of record are clouded by limited data, however the last 6 years of record dated 9 May 2006 through 8 May 2012 indicate an annual average of 41.91" of rainfall.

WAR contends that water budget calculations which are not based on available local information within the historical record are misleading, without merit, and do not provide a basis for rational decision making. If available local rainfall values are not used in hydrologic calculations all assumptions related to water budgets will be flawed.

The applicant uses regional rainfall and lake evaporation rate assumptions supporting a thesis that rainfall exceeds lake evaporation at the project site (DEIS Vol 2; Appendix D, Ardaman Assoc.; Table 8 "Annual Water Budget for King Road Mine": Avg rainfall 54", lake evaporation (LE) 48", Natural ET 38"). The assumption

inappropriately minimizes impacts associated with lake evaporation rate, hydroperiod modification, surface water discharge, aquifer recharge, aquifer drawdown and concludes a budget surplus. However, the local rainfall record suggests potential annual deficits in the range of 6 inches in context of lake evaporation and 12" of rainfall contribution, this being a comparison of the Bird Creek rainfall record and regional averages used by the applicant.

Lake evaporation is significant due to Alternative 2 projections of approximately 1,400 acres of lake pits that will remain at the conclusion of the project. If the applicant's assumption of average 48"/year LE is accepted, the annual accelerated water loss due to LE will present as ~380,160,035 gallons/year in perpetuity (ET-LE x 1,400 acres). Alternative 7 residual lake pits will generate approximately 1/3 of that loss, or ~126,720,000 gallons/year.

Such modification of the water cycle may induce unforeseen hydrologic impacts in and around the project area. In tandem with prolonged drought such modifications may exacerbate alterations in hydrologic processes improperly considered in the applicant's analysis.

Lacking application of appropriate data to water budget calculations, WAR must support Alternative 1.

### **Alternative supplies**

In addition to comments on alternative supplies submitted in summary of the WAR public hearing testimony, the following discussion is provided.

The applicant contends that only limerock from their selected project site is suitable for large scale production of product meeting Florida Department of Transportation (FDOT) certification within the market area. The DEIS discusses availability of natural reserves of limerock likely to produce aggregate which meets FDOT certification standards. Vol. 1, Figure 3-21 delineates local deposits of Avon Park Limestone which rise sufficiently to make extraction practical. Otherwise the project area is overlain by the Ocala formation.

Vol 2, Entrix Figure 1 generally agrees with the aforementioned Fig 3-21. Entrix Figure 1, which is broader in geographic scope, depicts four such formations of Avon Park Limestone, one of which presents in the northeastern quadrant of Alternative 2. The graphic representation and rationale used to support the applicant's site selection is, from all appearances equally applicable to the existing Holcim US Crystal River Quarry located on the south shore of the Cross Florida Barge Canal.

The Holcim US quarry has a FDEP ERP which provides for 4,815 acres of extraction and related activities. Holcim US owns approximately 6,000 acres in the area which is zoned for extractive use. Due to changes in Citrus County land use regulations, Holcim US can apply at will for expansion to the FDEP ERP successfully and gain ready access to formations of Avon Park limerock depicted in EntriX Fig 1.

The applicant stipulates that lower quality limerock in the proposed project area in the form of the Ocala Formation will be used for product markets other than FDOT. Further, it is indicated that some part of the Ocala Formation may produce FDOT grade limestone product (Vol 2 Florida Geology, Scott, Appendix 3). This formation overlies Avon Park Limestone formations in the majority of the project area, predominantly in the west and southern quadrants. Dr. Scott testifies that a single additional mine in Citrus County is certified by FDOT for road grade aggregate. As indicated in Attachment A, there are mining business plans at play in the market area which do not require FDOT certification. Such actions on the part of competitors do not mean FDOT quality aggregate is unavailable, only that such certification has not been sought.

WAR understands that FDOT is the largest customer of limestone products in Florida, but it is not the majority consumer. Overarching focus on FDOT quality aggregate in this analysis of need is inappropriate. The applicant suggests future developments such as the Progress Energy Levy power plant and Suncoast Parkway extension may serve as markets. The latter is presently unfunded and the future of the Progress Energy project is far from clear due to very high costs estimated at \$22-24 Billion dollars.

Citrus County, Florida is somewhat of an anomaly in land use planning and category designation. Unlike most jurisdictions in the state, Citrus County has a designated extractive land use category. Mr. Joe Hochadel of the county's GIS Department (352.527.5239 x 7687) advises that the sum total of such designated lands total approximately 8,000 acres. Access to the county GIS data base is found at <http://www.bocc.citrus.fl.us/plandev/grcp/grcp.htm>

The DEIS references 30 USC 1601 as basis to recognize the fundamental economic benefit and contribution to the nation from limerock mining. WAR recognizes and accepts such findings, and at the same time suggests such determinations are national in scope. The Congress did not intend for such findings to be used to justify local or regional projects at the broader expense of the people or other natural resources, thus the Corps' involvement in evaluating the application at hand. The applicant has clearly and repeatedly referenced within the DEIS Vol 2 the company's

“need”. We consider this more properly described as a “want” and henceforth differentiate the public need from business goals or objectives. The Corps does not have authority to directly modify business strategies and such considers such factors of small consideration in this review. The applicant seeks market foothold in the region. The applicant will sell product to the appropriate market segment, be it base material or different grades of aggregate. The benefit to the public should be measured by comparison of socio-economic and esthetic gain versus loss.

Reference is made by the applicant to population growth in the region and product demand projected by Urban Economics (Vol 2, Appendix 1). WAR does not find uniform support for the projected population growth and product demand represented in the document. On one part reference is made to the North Carolina Geological Survey average annual demand, which is understood to be a broad national per capita projection. Extending such calculation to the dynamics of the applicant’s market is thought inappropriate due to market specific demands. From a regional perspective there may be substantial differences in construction methods as compared to different portions of the country. They may present as road construction material (concrete vs. asphalt), home construction materials (frame vs. block or brick), vertical vs. sprawl development, or fill requirements due to the presence or lack of elevated terrain, etc. In short, market forces in northern or western regions of the U.S. may be wholly irrelevant to this region in Florida.

On the second part, review of population projections in the applicant’s market area gives pause. The Urban Economics document projects a population increase in the market area of 33.72% in the timeframe of 2010-2030. WAR finds the presentation misleading due to gross differences in demographics in the market subset areas. Support for this position may be found within the **Levy Nuclear Plant Units 1 and 2 COL Application Part 3, Volume 8, Section D, Environmental Report**, CHAPTER 2, Section 2.5.1 ENVIRONMENTAL DESCRIPTION, beginning on page 2-460. This document is not provided by WAR as reference but is available to the Corps due to Section 404 review under the auspices of the NRC EIS. Contact Mr. Gordon A. Hambrick, Regulatory Division, Panama City Section, USACE, 850/763-0717 x 25.

Examination of Bureau of Economic and Business Research (BEBR) county analyses suggests that while the percentage of projected growth is high, the actual population numbers for many of the counties in the market area is quite low, especially to the north and west of the I-75 corridor. A high “growth rate” does not mean significant increase in numbers in such regions. They will remain consistent with the rural nature of these jurisdictions in the projected timeframe. Therefore, the

primary market domain of the applicant will extend to the south and east. Access to all county BEBR analysis is available at:

<http://hodges.libguides.com/content.php?pid=20174&sid=1462831>

A work by Stanley K. Smith and Stefan Rayer who are part of the BEBR participants ([Attachment I, Rayer CV](#)) published "*Projections of Florida Population by County, 2010-2040*" ([Attachment J](#)) and suggested within is a looming trend for slower growth out to 2020. This is apparent now within Florida coastal regions and they note the significance of differentiating growth rates from absolute numbers. Further, they caution that mean percentage errors in long range projections increase in linear fashion as the time horizon expands and that projections for specific counties are difficult to post with certainty. Such uncertainties become significant in any attempt to evaluate need for the Tarmac project.

The applicant stipulates vertical integration as part of its business model, meaning it desires to function independently from other market players. Tarmac wishes to mine, process and produce concrete and aggregate products sans collaboration with competitors. In order to do so it is necessary to convert a portion of aggregate production into concrete or Portland cement, presumably at facilities or batch plants in the market area. Review of the following link from Titan America of which Tarmac is a subsidiary, indicates few if any such facilities exist within a 100 highway mile radius market area. The closest is Clermont, Florida at 78.6 highway miles from Inglis. The premise of vertical integration does not appear to be fully developed by Tarmac or its parent company Titan America in context of the subject application.

[http://www.titanamerica.com/our\\_company/locations/florida/](http://www.titanamerica.com/our_company/locations/florida/)

The applicant stipulates in the DEIS Vol 2, Alternatives Analysis, certain costs associated with dislocation from the proposed project area to nearby supplies of Avon Park limestone (Vol. 1, Figure 3-21) and other barriers such as land acquisition resistance. Such costs involve increased expense for electrical transmission lines, transportation etc. We suggest generally that resistance to the sale by land owners is inversely proportional to offered price. Tarmac will gross approximately \$36 million/year based on 3 million tons annual production and the 2011 market value of \$12/ton. Given an extraction rate of 25 acre/year, a gross value of \$1.44 Million/acre is implied for the resource. At such time that land owners perceive that higher returns on investment over their lifespan can be generated by sale to mining interests, they will act to do so. In other words, market forces will resolve such issues.

The applicant alleges northerly alternative locations (Area A and B, Vol 2, Entrix Figure 1) would meet more resistance from residents and the County Administration. WAR is at a loss to comprehend such assertions in light of DEIS Vol 2, Appendix 4, Fig 1 (population density). It is possible that land holdings in the vicinity of Area A and B held by a past County Commission Chairman have influenced the applicant's perception, but we find no explanation in the DEIS for either allegation.

WAR does not consider greater costs associated with locally dislocated project alternatives significant or worthy of the Corps' examination.

DEIS Vol 1, Pg 2-6, Table 2-1 summarizes mining productivity and product costs in adjacent states and several neighboring countries from 2002-2010. Production/demand in Florida, Georgia and Alabama peaked in 2006. However, costs associated with product have consistently increased despite the economic downturn that began in 2007. During the period of record, product from Georgia and Alabama were cost competitive with exclusion of transportation expense as compared to Florida through 2004. Since then the cost of limestone product in Florida has given competitive advantage to our neighboring states such that in 2010, Georgia product was approximately 14% cheaper. Alabama product was 31% cheaper. While product cost is a single component of cost to the user and the aforementioned costs do not include shipping expense, WAR notes that such disparity in raw product cost mitigates transportation costs substantially.

Limerock products procured from foreign points of origin indicate similar disparity with the exception of Canada, that being at parity with Florida production costs. The Bahamas are at rough parity with Alabama, but Mexico has a 45% cost advantage over Florida. The perceived advantage of foreign imports is based on landed value.

WAR recognizes transportation by truck is expensive and provides basis for the limits of the applicant's market area. We are also aware that transport by rail or ship is significantly more efficient and less costly per ton mile.

A note below Table 2-1 indicates exclusion of import duties and/or tariffs in cost analysis. Provisions of NAFTA and CAFTA exempt the aforementioned tariffs and duties for import category 2517 shipped from the countries reviewed. For further examination see the web links below, [Attachment K](#), or contact Mr. Fred Schottman, Office of Tariff & Trade Agreements, (202) 205-2077.

[https://help.cbp.gov/app/answers/detail/a\\_id/277/~/harmonized-tariff-schedule---determining-duty-rates](https://help.cbp.gov/app/answers/detail/a_id/277/~/harmonized-tariff-schedule---determining-duty-rates)

<http://www.gpo.gov/fdsys/pkg/CFR-2011-title19-vol1/pdf/CFR-2011-title19-vol1-sec24-24.pdf>

Citrus County has intent to develop the Cross Florida Barge Canal and adjoining land districts as Port Citrus. Limerock shipments by barge have been made from the Cemex Inglis Quarry (Barge Canal), and are underway on continuous basis by the Holcim US Crystal River Quarry which finds economic traction in shipping unprocessed limerock to Mobile, Alabama via barge. This demonstrates there is potential excess limerock capacity locally and also the economic feasibility of transportation as far as Alabama.

It is not clear to WAR that economic factors examined to date in this market are fully developed. We understand that long range truck transport is expensive but recognize there are fully developed rail networks throughout the target market area and existing terminals for sea transport. We note the Port of Tampa 70 mile radius includes the region of heaviest development activity and densest population within the applicant's projected market area. While recognizing that foreign supplies do not meet demand at present, we note foreign import tonnage has remained relatively consistent through the period of record in contrast with production/demand of Florida product and therefore conclude foreign sources of aggregate are economically competitive. We note that gross production tonnage in Alabama and Georgia, in total, consistently out paces that of Florida despite smaller sum population.

WAR concludes that market forces drive the industry far more efficiently than planning and that other transport modes may contribute substantial modification to the applicant's business plans over the 110 years of the project life. There is no clear and reliable mechanism for accurate forecasts over such extended timeframe.

#### **Project Alternatives and determination of a preferred alternative**

While it is useful to make long term projections for purposes of future land use and mitigation planning, such expectations are subject to change. In the context of planning, they are indeed expected to change. It is nonsense to make irrevocable decisions which commit the parties for 110 years amidst a vast sea of uncertainty. Assumptions used for climate, sea level impact, storm frequency and magnitude, aggregate market demand, out of state, in-state and foreign supply, transportation options, and transportation costs are all based on current conditions or historical observations and present no strong case for extrapolation of these factors to a 110 year horizon. We question whether projections made in 1902 would have

adequately predicted market demand in 2012, much less the environmental and ecological impacts and consequences.

Project alternatives are reviewed thoroughly in the DEIS through both volumes. The analysis presented by the Corps regarding resource impacts or potential impacts are generally sufficient in scope to support selection of a preferred alternative without substantial modification to the alternative menu. Potential impact projection is however clouded by the proposed duration of the project and the uncertainty attendant to forecasts over such a lengthy period. WAR is not aware of any significant investigation or testimony by the applicant regarding tropical storm impacts or sea level rise. We cannot support alternatives which are at risk without reasonable expectation that predictable events will not overwhelm inappropriate or inapplicable design criteria.

On one part is the issue of public need, but on the other is potential harm to the public in context of the issues discussed previously in this document. The balance of economic synergy must not be negative or neutral in the end result of the project, but rather positive for all players. Forestry is infinitely repeatable as an economic model, mining is not. The contribution to the Levy County economy discussed in the BEBR documents regarding forestry and other economic activities are, in and of themselves, positive net contributors. Revenues generated through recreational activity within Gulf Hammock and the adjacent Waccasassa Bay State Park is likewise theoretically infinite. There must be a clear and unambiguous benefit to the public if this project is to be allowed.

### **Conclusions**

1. WAR finds the applicant's examination of risks deficient due to lack of thorough examination of tropical storm impacts, disregard of impacts associated with sea level rise or cumulative impacts resulting from the combination thereof.
2. No data is provided upon which to support the thesis that earthen berms might survive intact through TS-CAT 2 tropical storm events. Given the failure of robust levee structures in New Orleans during the landfall of Hurricane Katrina and that those structures were intended to protect against the specific intensity present in that storm, there is absolutely no reason to expect earthen structures to prevail in such circumstances. The design criterion for such structures around mine lake pits is the 100 year storm event, not tropical storm impacts. Tropical storm events in this region are not a statistical risk,

they are a certainty. In order that a permit for this project be properly founded it is necessary that known risks be fully evaluated.

The legal authority of the applicant to construct berms to 19' NGVD elevation in the western portions of Alternative 2 is clouded by Levy County Code ([Attachment A](#)), thus rendering storm protection by berms problematic.

3. The applicant suggests that blasting vibration exceedances identified in the DEIS can be managed, but offers no supporting evidence. Indeed, examination of reduced charge geometry also failed to meet standards established by Federal authority and adopted by the State.
4. The applicant offers meteorological data in support of water budget calculations which is not applicable to the project location and results in misleading conclusions and/or assumptions.
5. There is no sound basis for approval a permit for Alternative 2 or for a period of 110 years in any scenario.

Detailed state permitting of this project by FDEP and as presently considered by the Corps extends only through a single 10 year construction phase and an additional 10 year operations phase. The Corps is asked by the applicant to issue a life of the mine permit for a period which will extend approximately 110 years. Initial phases of the project impinge on western regions of Alternative 2 which are profoundly vulnerable to tropical storm impacts.

6. WAR differentiates the public need and applicant's desires. It is not clear the public need cannot be met by existing alternative supply sources. With fair consideration of federal code we conclude various complaints of economic barriers or geographic constraints of small significance in this review.
7. The very nature of the proposed project life renders understanding of potential impact excursions problematic. There is no substantial testimony rendered by the applicant upon which to base projections extending for 110 years. Market forces are complex and difficult if not impossible to forecast into the next century. Unforeseen developments in transportation or market demand cannot be realistically forecast.

One hundred and ten years ago heavier than air flight did not exist. 14 percent of homes in the U.S. had bathtubs. There were fewer than 8,000 cars and 144 miles of paved road in this country. The population of Las Vegas was about 30. 20% of adults in the U.S. could neither read nor write. There were about 230 murders per year in the U.S. World Wars had yet to be conceived.

Given the ever accelerated pace of technological advance none of us can predict the future so far in advance, including the applicant.

### **Recommendations**

1. WAR recommends Alternative 1 as the preferred alternative at the conclusion of formal review of the application. We do not perceive sufficient evaluation of long term risks by the applicant, or examination of certain impacts due to Sea Level Rise and tropical storms. We find no evidence which supports suggested mitigation of impacts resulting from blasting vibration beyond year 40 of project Alternative 2. There is no credibility whatsoever to be found in any forecast extending to the end of the proposed 110 year project life of Alternative 2.
2. We are mindful that our understanding of the Section 404 review underway for this application is imperfect and the Corps may be obliged to select a different preferred alternative than Alternative 1. Given such circumstances it is clear that direct adverse impacts are more or less proportional to Alternative acreage and it is also clear that some protections against tropical storm impacts are found at higher terrain elevations in the eastern portions of Alternative 2. The shorter project terms which correlate to alternatives 3-8 lend time inverse validity to applied assumptions and forecasts suggested by the applicant.

If there must be determination of a preferred alternative which allows development of this project, WAR suggests that contingent upon comprehensive analysis of tropical storm and SLR impacts, Alternative 7 is the only reasonable choice for the following reasons:

- 1) Compatibility and wetlands impact is minimized.
- 2) The highest quality limerock is most accessible within this alternative.

- 3) Development projects such as the Progress Energy Levy power plant and Suncoast Parkway extension are at best speculative at this time. The square of speculation is uncertainty.
- 4) Potential hydrology impacts, direct and indirect are minimized.
- 5) Should the Corps elect to entertain further evolution in this project, it will have a better data and experience base with the project as Alternative 7 nears conclusion. WAR does not favor multiple reviews of this project but fully recognizes such decisions are not within our purview.

We extend our appreciation to the Corps for professional and courteous demeanor during our involvement in this review.

For WAR, Inc.,



Dan Hilliard  
Director  
352.447.5434

July 9, 2012

Department of the Army  
Jacksonville District Corps of Engineers  
Pensacola Regulatory Office  
41 N. Jefferson St., Suite 301  
Pensacola, FL 32502

Subject: Comments on Tarmac King Road Mine DEIS

We thank you for your in-depth review of this project and offer the following comments. We hope you will consider our thoughts and conclusions in making the final determination on this project.

**Wetlands impact – Mitigation areas are improperly selected**

We do not agree that the loss of 720 - 2069 (Alternatives 7 and 2) acres of wetlands habitat can be compensated for by enhancement in the mitigation parcel.

Alternatives 2 and 5 result in net wetland losses which are not even proposed to be compensated by the mitigation... "Mitigation" calculations for Alternatives 3, 4, 6, 7 and 8, appear to suggest the mitigation areas are adequate to compensate for wetland losses, but that is only true for the very near term. Rising sea level will cause much of the "mitigation" area to be inundated and become submerged lands over 110 years. There is no "mitigation" from submerged marshes. The applicant must be required to provide "mitigation areas" selected such that they are no more likely to flood than the areas they are "mitigating".

**Potential Impact on Area Wells**

At present there is no significant chloride contamination in ground water within or without the project area, however wells in Cedar Key have just in the last few days experienced sudden unexpected, unexplained, and catastrophic chloride contamination rendering them unfit for use.

**Storm impacts**

Some parts of the proposed Alternative 2 project area in the eastern portion are somewhat protected at the present time due to elevation. BUT this is under current Sea Level height and shoreline location. Over 110 years the shoreline will move eastward and sea level will rise.

Category 1 and 2 tropical storms occur regularly in Florida, and it is only common sense that Category 3 and higher storms should be considered in development of the EIS for any location in Florida or the Gulf Coast. It would be nonsensical to argue that because a Category 4 or 5 storm has not impacted this area yet that it will not occur in the next 110 years!

A detailed analysis of the potential impact associated with ALL intensities of Tropical Storms Category 2-5 should be required, including moderate and d worst case rainfall and all scenarios for Sea Level Rise over the requested project period.

**What Makes Us Think The Berms Will Not Be Inundated Or Washed Away During Storms?**

The review should provide detailed engineering analysis of the earthen berms to show whether they withstand Category 2, 3, 4 and 5 tropical storm impacts. In New Orleans, the storm breached the berms and we need to be certain that will not happen here.

**Sea Level Rise**

Tropical storm impacts will increase as Sea Level rises. All storm impact risks should be recalculated to show tropical Storm risks under worst case Sea Level rise over the full project life.

**Rainfall estimates**

This area of Florida is already under stress due to drought and excess ground water extraction so accurate evaluation of water budgets is important.

Average annual rainfall used in the DEIS for Levy County (54.94") and Citrus County (54.12") are inappropriate and ignore available local data. In 2008 the Florida Office of State Climatologist reported the annual average of rainfall at Cedar Key was only 47.41". The Bird Creek rain gauge located near the end of County Road 40 on the Gulf Coast and within the town limits of Yankeetown, for 9 May 2006 through 8 May 2012 indicate an annual average of 41.91" of rainfall in the immediate area.

If the applicant wishes to use the long term County averages for calculations, they should also show calculations for local and current rain gauges. People and habitats are affected by what is actually happening in a particular place at a particular time, not by the expectation that over larger areas and long time periods, everything will average out.

In the context of requesting a permit for 110 years, the applicant should also consider scenarios of prolonged drought and prolonged periods of excessive rainfall and the impacts they may have.

### **Market Demands and Alternative Supplies**

There is much uncertainty about demands over 110 years. So much so that extrapolation of market supply, demand and sources, is essentially meaningless.

There is no obligation on the public to assure that TARMAC can supply every need of every market. The focus on FDOT quality aggregate, as though FDOT is the only customer in this analysis of need is misleading. The applicant suggests future developments such as the Progress Energy Levy power plant be potential markets, but the future of the Progress Energy project is far from clear due to very high costs. Such uncertainties become significant in any attempt to evaluate need for the Tarmac project.

Limerock is currently supplied from Georgia, Alabama, and Mexico. Limerock shipments by barge have been made from the Cemex Inglis Quarry (Barge Canal) and by the Holcim US Crystal River Quarry to Mobile, Alabama via barge, demonstrating both that there is already excess limerock capacity locally and also the economic feasibility of transportation as far as Alabama.

The applicant's 90 mile radius projected market area overlaps the market area of the Port of Tampa, which shows the feasibility of supplying the proposed TARMAC market with product transported by ship or rail from product imported into Tampa.

We conclude that at present, there are viable alternative supplies. Over 110 years, market demand may change; other transport modes may contribute substantial modification to the applicant's business plans, and even appropriate types of construction materials may change with technology and new and improved vehicles. There is no clear and reliable mechanism for accurate forecasts over such extended timeframe.

### **Use of Very Long Term Projections is Inappropriate for Irrevocable Decisions**

While it is useful to make long term projections for purposes of future land use and mitigation planning, such long term projections are known and expected to be subject to change, and, in the context of planning, it is expected that plans will be adjusted incrementally over time to accommodate change.

It is utter nonsense, however, to make irrevocable permitting decisions extending out 110 years based on such projections. Assumptions used for climate, sea level impact, storm frequency and magnitude, aggregate market demand, out of state, in-state and foreign supply, transportation options, and transportation costs are all based on current conditions or historical observations and there is no reason to believe these can be accurately projected out 110 years. We question whether projections made in 1902 would have adequately predicted market demand in 2012, and much less the environmental and ecological impacts and consequences.

### **A Far Shorter Permit Period Would Better Protect the Public Interests and Should be of No Detriment to TARMAC**

The State permit for this project by FDEP is only for 20 years (10 years development and 10 years operations). This is reasonable and forward-thinking and allows for adjustment in the future due to changing conditions and increased knowledge.

We see no rational, nor any urgency, for approval of any Alternative for issuance of a permit of the duration requested by the applicant.

TARMAC asserts there are market needs for 110 years. TARMAC asserts that it can effectively manage environmental and ecological impacts such that there is no degradation in our environment and quality of life over 110 years. If these assertions by TARMAC are true, and if TARMAC truly is confident in them, then TARMAC should see no risk with a permit of shorter term. The demonstrated success of their project after 20 years, economically and environmentally should make them confident in applying for future phases based on track record.

Shorter project term and a requirement for demonstrated success prior to permit extensions offer infinitely greater public protection. The only reason TARMAC needs 110 years is "just in case" the results after 20 years prove to be less beneficial to the public than projected.

### Conclusions

1. Evaluation of Tropical Storm impacts is not sufficient. Detailed examination of risks associated with ALL intensities of Tropical Storms Category 2-5 should be required. Evaluation of the impact of tropical storms should include moderate to worst case rainfall and all scenarios for Sea Level Rise over the requested project period.
2. Rising sea level will cause much of the "mitigation" area to be inundated and become submerged lands over 110 years. There is no "mitigation" from submerged marshes. The applicant must be required to provide "mitigation areas" selected such that they are no more likely to flood than the areas they are "mitigating".
3. There is no reason to believe the earthen berms will withstand tropical storms. The levees in New Orleans failed during Katrina and we are very concerned that the same could happen here. Detailed engineering calculations and detailed tropical storm simulation data should be provided.
4. Rainfall amounts used overstate the actual rainfall in the area and may result in misleading conclusions. Also they are long term averages. More relevant rainfall figures should be used. Also the potential effect of prolonged drought or prolonged periods of excessive rainfall should be considered.
5. The State permit of this project by FDEP is only for 20 years, allowing re-evaluation of assumptions, conditions and potential impacts at that time. We do not see any reason the Corps should not take the same prudent approach. Any further project

duration should require a new permit application which would take into consideration changed in the economic and environmental conditions over 20 years and the applicant's success in meeting permit terms as well as environmental protection and mitigation goals.

6. It is not clear the public need cannot be met by existing alternative supply sources. In the event that it cannot, the lower risk solution is to permit for a much shorter time horizon, allowing for adjustment to future conditions when they can be better known.
7. Given the deficiencies noted above, Alternative 1 is the only Alternative that provides protection of our environment. We do not perceive sufficient evaluation of long term risks by the applicant, or examination of certain impacts due to SLR and tropical storms. Effective mitigation areas which will last the duration of the proposed project period are not provided. Alternative 7 results in less wetland impacts and some minor protection against tropical storm impact in the very near term and would be the only other Alternative that should be considered.
8. If any Alternative other than Alternative 1 is selected, the applicant must be required to provide "mitigation areas" that are no more likely to flood than the areas they are "mitigating".
9. Construction of wetlands mitigation areas is not simple nor certain to be successful. Any mitigation areas should be completely constructed and demonstrated functional prior to commencement of any construction other than that required to access the mitigation areas.

Sincerely,

Jean and John Holbrook



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July 10, 2012

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Re: Levy County, Draft Tarmac King Road Limestone Mine Environmental Impact Statement (Draft EIS)

Dear Mr. Sarfert:

Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed the Draft EIS for the Tarmac King Road Limestone Mine, a large, long-term limestone mining operation in Levy County. We are providing the following comments for your consideration, in accordance with the Chapter 379, Florida Statutes.

### Project Description

The U.S. Army Corps of Engineers (USACE) prepared a Draft EIS to assess impacts of proposed filling of wetlands associated with limestone mining in Levy County. The specific objectives regarding excavation of limestone at the proposed site are: 1) to evaluate the existing environmental condition and potential future impacts; 2) evaluate the existing socioeconomic condition and potential future impacts, and 3) describe and assess alternatives to limestone mining. In addition to the proposed mining plan submitted by Tarmac, the draft EIS considers seven additional on-site alternatives developed and assessed by USACE. One of the alternatives is the no mining alternative, while the others present a series of reductions to the proposed mine footprint.

The proposed Tarmac King Road Limestone Mine would be located in western Levy County just west of U.S. Route 19 and about 5 miles north of the town of Inglis. The overall project involves two parcels totaling approximately 9,300 acres. The mining parcel is 4,751 acres and an adjacent mitigation parcel is 4,526 acres. The western portion of the mitigation parcel abuts the Waccasassa Bay Preserve State Park. Both parcels are contained within the 24,625-acre Gulf Hammock Wildlife Management Area – a popular public hunting area managed by the FWC in conjunction with Plum Creek Timber Company. The property is part of an active silviculture operation and most of the vegetation is in varying stages of post-logging re-growth.

The Tarmac King Road Limestone mine permit would be a 100-year permit with approximately 25 to 30 acres mined per year; the estimated land cover impact is approximately 3,900 acres out of the approximately 9,300 total acres. The site's highest quality wetlands, contained on approximately 852 acres, would be avoided and placed under a perpetual conservation easement. The entire property would remain under its current ownership, though the landowner has agreed to continue to allow public hunting on those portions of the parcel that are not being actively mined. An estimated 1,506

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acres of man-made lakes will remain when mining is completed. These lakes are not currently proposed for recreational opportunities such as fishing, canoeing or boating; however, the applicant recognizes that post-mining reclamation measures might allow such opportunities.

Mitigation for mining activities is proposed on the 4,526 acre parcel adjacent to the mine site. No decisions have been made regarding the ownership, management, or inclusion of conservation easement(s) on the mitigation parcel. The options being considered include a fee-simple donation to the state, preservation as part of the Florida Forever Project, or an addition to the Waccasassa Bay Preserve State Park. It is the applicant's intent to allow continuation of hunting and similar recreational activities on the mitigation parcel. The applicant also proposes to monitor the mitigation parcel for ecological success; however, if at any time it is determined that recreational activities would restrict ecological management or progress toward mitigation success criteria, such activities would be discontinued and a corrective strategy developed.

#### **Potentially Affected Resources**

The Draft EIS reports that the only federally listed threatened or endangered species observed on-site were the wood stork (*Mycteria americana*) and the eastern indigo snake (*Drymarchon corais couperi*). Based on the applicant's analysis of suitable habitat for other listed species, it was determined that the endangered Florida salt marsh vole (*Microtus pennsylvanicusduke-campbelli*) may exist in the mitigation parcel; however, voles were not observed during the field surveys.

Both properties lie within secondary range for the Chassahowitzka population of the Florida black bear (*Ursus americanus floridanus*), which is important for maintaining movement of bears between areas considered as primary range.

A single active gopher tortoise [*Gopherus polyphemus*, (State Threatened)] burrow was observed in marginal habitat located on the far eastern edge of the mine parcel. No other suitable habitat for tortoises appears to exist on-site.

State-listed Species of Special Concern (SSC) observed or expected to occur on-site include snowy egret (*Egretta thula*), tricolor heron (*Egretta tricolor*), little blue heron (*Egretta caerulea*), white ibis (*Eudocimus albus*), reddish egret (*Egretta rufescens*), limpkin (*Aramus guarauna*), and roseate spoonbill (*Platalea ajaja*). Several of these species have been observed roosting onsite.

The applicant intends to implement the U.S. Fish and Wildlife Service (USFWS) Standard Protection Measures for the eastern indigo snake and take additional measures to ensure they are protected. Such measures include pre-clearing surveys, providing a qualified observer for all ground clearing operations, reducing speeds when possible and annual reporting to USFWS on the status of implementation and operations of the mitigation project.

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**Comments and Recommendations**

Florida black bears have the potential to occur within the mine parcel and vicinity. Human-bear conflicts may cause a wide range of impacts from property damage to safety concerns. Electric fencing is an available tool that has been proven effective in deterring bears. For the safety of both the bears and the mine personnel, we recommend the applicant consider fencing for each active mine unit (please refer to enclosed bulletin for more information).

The applicant has committed to conducting eastern indigo snake surveys onsite. To better identify potential impacts to other wildlife resources, we also recommend that these surveys be expanded to include state-listed species potentially occurring onsite (e.g., gopher tortoise and wading bird surveys). Wildlife surveys should follow established survey protocols approved by the USFWS and FWC. Basic guidance for conducting wildlife surveys may be found in the Florida Wildlife Conservation Guide (<http://myfwc.com/conservation/value/fwcg/>).

Lastly, the applicant has indicated that mine reclamation procedures could be implemented to enhance the habitat and recreational potential of the site's future man-made lakes. Additionally, both mining and habitat enhancement measures could affect traditional hunting and recreational activities on over one-third of the Gulf Hammock Wildlife Management Area. FWC staff has considerable experience with mine land reclamation and with conducting habitat restoration programs, as well as managing public hunting, fishing and recreational use areas; therefore, we encourage the applicant to maintain an active and sustained working relationship with FWC for the reclamation, restoration, and management of this property.

FWC appreciates the opportunity to review this project and looks forward to continued coordination on fish and wildlife related issues. If you need further assistance, please do not hesitate to contact Jane Chabre either by phone at 850-410-5367 or at [FWCConservationPlanningServices@myFWC.com](mailto:FWCConservationPlanningServices@myFWC.com). If you have specific technical questions regarding the content of this letter, please contact Tim King at 863-648-3200 or by email at [timothy.king@myFWC.com](mailto:timothy.king@myFWC.com).

Sincerely,



Bonita Gorham  
Land Use Planning Program Administrator  
Office of Conservation Planning Services

bg/jdg/tk  
Tarmac King Road Limestone Mine\_16296\_071012  
ENV 1-5-2  
Enclosure

cc: Matt Chopp, FWC  
Dave Telesco, FWC

## Hopping Green & Sams

Attorneys and Counselors

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Writer's E-mail: [mikec@hgslaw.com](mailto:mikec@hgslaw.com)

July 11, 2012

Mr. Edward Sarfert  
U.S. Army Corps of Engineers  
Regulatory Division  
41 North Jefferson Street, Suite 301  
Pensacola, FL 32502-5794  
[Edward.P.Sarfert@usace.army.mil](mailto:Edward.P.Sarfert@usace.army.mil)

*Re: Tarmac America LLC Comments on Tarmac King Road Limestone Mine  
Draft Environmental Impact Statement*

Dear Mr. Sarfert:

On behalf of our client Tarmac America LLC ("Tarmac"), we submit the following brief comment letter on the Tarmac King Road Limestone Mine Draft Environmental Impact Statement (the "King Road Draft EIS") to the U.S. Army Corps of Engineers (the "Corps") for consideration.

First, in Section S.2 and 1.2, the King Road Draft EIS characterizes the project site as being 9,400 acres in size, but the two parcels combined are actually about 9,277 acres in size (4,750.5 acres in the mine parcel, and 4,526.5 acres in the mitigation parcel). While these and other numbers used in these sections of the King Road Draft EIS appear to be approximations, it is unclear why approximations are necessary in some instances but not others, when the precise numbers are in fact available and used elsewhere in the document. Accordingly, we suggest the Corps include the precise numbers in these and all other sections of the Final EIS.

Second, in Section 3.2.2.1, the discussion regarding numeric nutrient criteria should be updated in the Final EIS to reflect the most current status. As you are likely aware, the Florida Department of Environmental Protection ("DEP") has proposed state numeric nutrient criteria that would incorporate regional and other situation-specific differences, which DEP submitted to EPA last month (June 2012) for approval. If DEP's proposal is accepted by EPA, the proposed nutrient and chlorophyll a concentration criteria will vary slightly from the proposed EPA values and will also vary somewhat by region within Florida. We anticipate EPA will take final action on DEP's proposed state numeric criteria by August 2012; EPA's final action on the state's proposal should therefore be reflected in the Final EIS.

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Finally, in our review of the King Road Draft EIS, we identified a few minor typographical errors that we would like to call to your attention:

- Section S.8.1.1.5 – “are recycled” should read “of recycled” in both instances;
- Section S.8.1.1.5 – Delete the word “define” after “RCA” near the end of the passage;
- Section 2.2.1.5 – “are” should read “of”; and,
- Section 3.5.1 – “nor” should read “not.”

Clearly, the Corps and SAIC have already put a considerable amount of time and effort into the King Road Draft EIS; we believe these limited comments will only make the document even stronger. Should you have any questions regarding these comments or any other issues, please do not hesitate to contact us. Thank you.

Best Regards,

Hopping, Green & Sams, P.A.



---

Miguel (“Mike”) Collazo, III

cc: Cindy Burns  
Jeff Harris  
Frank Matthews

Hopping Green & Sams



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

7/11/2012

Edward Sarfert, Senior Project Manager  
U.S. Army Corps of Engineers  
Regulatory Division  
41 N Jefferson Street, Suite 301  
Pensacola, Florida 32502-5794

Subject: **Comments on the Draft Environmental Impact Statement (DEIS) for  
Tarmac King Road Limestone Mine, Levy County, Florida  
Filed: 05/3/12; CEQ Federal Register: 05/11/12  
CEQ Number: 20120138; ERP Number: COE-E67006-FL**

Dear Sir:

Pursuant to Section 309 of the Clean Air Act (CAA) and Section 102(2)(C) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the "Draft Environmental Impact Statement (DEIS) for Tarmac King Road Limestone Mine" dated May 2012. EPA understands that this DEIS was developed by the Regulatory Branch of the Jacksonville District, U.S. Army Corps of Engineers (COE), and was prepared in response to an application submitted by Tarmac America LLC (Tarmac) for a U.S. Department of the Army permit under Section 404 of the Clean Water Act (CWA) of 1972 (33 U.S.C. 1251 et seq.) associated with proposed limestone mining activities within southern Levy County in west-central Florida. The site is approximately 80 miles north of Tampa, Florida, and is located in Levy County just west of U.S. Route 19, approximately 5 miles north of the town of Inglis. EPA notes that in preparation of this DEIS, the COE considered public and agency comments received during a 60 day scoping period ending April 26, 2008. EPA also notes that two public scoping meetings were held on March 26 and 27, 2008, in Levy County, Florida, and a summary of scoping comments received is found in Chapter 1 of the DEIS. Also, EPA's Section 404 Project Manager, Mr. Eric Hughes, conducted a site inspection on April 12, 2012 along with the Jacksonville District COE Regulatory Division Project Manager and a representative of the applicant.

The DEIS notes that Tarmac's permit application proposes to mine areas that include wetlands, as well as discharging dredged or fill material into waters of the United States during the mining process. The mined material would provide construction-grade limestone aggregate for Florida road infrastructure and other building activities. The proposed site would be mined over an approximately 100-year period, and Tarmac is proposing to mitigate the adverse impacts of this action by restoring, enhancing, and preserving an adjacent wetland area. The overall Tarmac King Road Limestone Mine project involves two parcels of land totaling about 9,400 acres (15 square miles), 2,700 acres (4 square miles) of which would be mined. The overall mining area is on an approximately 4,800-acre (7.5-square-mile) parcel, and the proposed mitigation area is an

approximately 4,600-acre (7.2-square-mile) parcel. The western portion of the proposed mitigation area adjoins the Waccasassa Bay Preserve State Park.

EPA notes the DEIS appropriately evaluates the existing environmental conditions and potential future impacts associated with the mining of limestone from the proposed Levy County site. We note that, as required under NEPA, the DEIS evaluates the existing socioeconomic conditions and potential future impacts associated with the excavation of limestone from the proposed mine site in Levy County, and fully describes and assesses alternatives to limestone mining at the proposed site. EPA also notes that the DEIS considers sources of limestone outside the Levy County area. The DEIS appropriately quantifies potential mining impacts of “up to 2,069 acres of wetlands and 1,818 acres of uplands over a period of approximately 100 years.” The DEIS states that Tarmac proposes that approximately 4,195 acres of wetlands and 331 acres of uplands in an adjacent area would be restored and/or preserved, and up to 522 acres of wetlands and 329 acres of uplands on the proposed mine parcel would also be preserved.

The DEIS appropriately analyzes a wide range of alternatives that vary according to “timing, mining breadth, mine location, and alternate source of aggregate.” In accordance with NEPA, the alternatives include the No Action Alternative, the full mine-out plan (100 years of mining), limiting mining in environmentally sensitive areas, shipping aggregate into Florida harbors and/or rail terminals, and mining in other locations of west-central Florida.

**EPA offers the following specific comments on relevant sections of the DEIS:**

**1. Project Purpose and Need**

EPA notes that the project will provide a “source of affordable construction-grade limestone aggregate including aggregate that meets Florida Department of Transportation (FDOT) specifications for buildings and infrastructure to satisfy the long-term public need for high-quality aggregate” for west-central Florida. The DEIS notes that over the 5 years from 2006 to 2010, Florida produced over 430 million tons of crushed rock, with a peak annual output of 140 million tons in 2006. The DEIS also notes the demand for crushed rock is lower now than in the years leading to that peak demand in 2006, but states that “nonetheless, construction of housing units, nonresidential building space, roads and other infrastructure in west-central Florida will still result in the continued need for high-quality construction aggregate.” EPA recommends that if more recent data is available on production rates and aggregate demand, the FEIS should be updated to reflect the newer data. EPA notes that the DEIS does not identify potential use of the rock for the proposed construction of the adjacent Levy Nuclear Plant, even though large quantities of aggregate will be needed for this multi-billion dollar and multi-year construction project if it is built.

**2. Alternatives Analysis**

EPA notes that the alternatives analysis identified and evaluated a range of reasonable alternatives that would meet the stated purpose and need for the project. This analysis qualitatively screened both the offsite and onsite options that could feasibly

satisfy the need for an economical source construction grade limestone aggregate, including aggregate that meets the FDOT specifications, for buildings and infrastructure to satisfy the long-term public need for aggregate in west-central Florida. The alternatives were appropriately subjected to further evaluation to consider the impacts that each alternative would have on the human and natural environment.

The DEIS notes that higher-quality Florida limestone is primarily mined from four designated resource areas: the Lake Belt, Charlotte-Lee County, Sumter-Hernando-Citrus County, and the Taylor-Dixie-Big Bend area. The DEIS reports that the quality of Florida rock available from non-Lake Belt supply areas “has been steadily declining.” To support this assertion, EPA recommends that more information be provided in the DEIS about the rock quality trends of these non-Lake Belt areas. EPA also recommends that Table S-1. *2001–2010 Averages, Peak, and Projected Demand for Crushed Rock Based on Current and Projected Population Growth in Florida and the Tarmac Primary Market Area* be updated if the data is available.

### 3. Water Quality Issues

Analysis of potential surface water quality impacts is provided for each alternative in Chapter 4. The DEIS appropriately notes that “all of the proposed alternatives have the potential for impacts on surface waters on and off of the site.” The proposed mining activities could result in onsite impacts on intermittent streams and constructed lakes and offsite impacts in receiving watersheds, and EPA concurs with the applicant’s plan to implement construction controls with a comprehensive restoration program of disturbed areas upon completion of mining. EPA concurs with the applicant’s stated goal of minimizing the potential for adverse impacts to onsite surface waters, as well as any off site receiving waters.

EPA notes that, in accordance with NEPA, the DEIS appropriately evaluated direct and secondary impacts from construction and mining activities. EPA also notes that the DEIS considers hurricane surge impacts, which have the potential to flood the project mine site, including potential for inundation of the western half of the site during Category I and II hurricanes and potential for inundation of the entire project mine site during Category III through V hurricanes. The DEIS notes that active mining areas and remaining lakes are proposed to be protected from coastal flooding by construction of a perimeter berm with a top elevation corresponding to the projected Category III hurricane storm surge elevation and the 100-year storm surge elevation, 19 feet National Geodetic Vertical Datum. Finally, EPA notes that sea-level change impacts are evaluated in the DEIS using the US Army Corps of Engineers’ latest guidance on incorporating sea-level change into project design. The highest predicted sea-level rise of 5.7 feet results in the extreme southwestern end of the mining site being inundated after approximately 85 years of mining. Much of this potential inundation on the mining site would be in lands preserved as dedicated No-Mine Areas. The DEIS notes that mining areas in the other action alternatives would reportedly “not see inundation under any of the 100-year sea-level rise projections.”

Results of water quality monitoring at the project site and mitigation site indicate “good water quality” with respect to inorganic constituents, including metals, and gross

alpha as well as organic constituents including Benzene. The DEIS does note that low dissolved oxygen (DO) conditions occur throughout the areas sampled and reportedly reflects a regional condition. DO concentrations ranged from 0.4 to 8.6 mg/L for the data set, with 33 out of 36 samples below the FDEP Class III water quality standard for dissolved oxygen (5.0 mg/L). Existing turbidity levels are considered low reflecting good water clarity. The influence of saltwater is evident in the westernmost stations closest to the Gulf of Mexico, with slightly increased chloride, salinity, and sulfate concentrations at these locations.

EPA has proposed numeric criteria for total nitrogen and total phosphorous for Florida surface waters. Site specific values indicated in the surface water quality database indicate these expanded ranges may be exceeded at the site. At the time the DEIS was being prepared, the proposed EPA criteria had not been finalized and therefore did not constitute regulatory standards. FDEP is currently working on state standards that may differ from EPA's proposed standards and could replace them if approved by EPA. The FEIS should be updated to reflect any future approvals of nutrients criteria.

DEIS Appendix 3.16 "References" lists EPA's Section 303(d) List Fact Sheet for Watershed Waccasassa, which was accessed through EPA's Total Maximum Daily Load (TMDL) website and reviewed in preparation of the DEIS. It is unclear in the DEIS if any TMDLs have been approved for waterbodies within the proposed mining areas. If TMDLs are approved or established before the FEIS is published, the document should be updated to reflect these approvals. The FEIS should be updated for any recent TMDLs (DO, CBOD, nutrients, sediment, siltation and habitat alteration, etc.) and the most recent 303(d) (impaired waters) status of receiving/downstream waterbodies draining the mining lands.

EPA recommends that additional information/data be provided in the FEIS regarding how surface water quality could be impacted by the proposed limestone mining. For example, the FEIS could cite research (or collected data) that provides a comparable example of the expected impact on surface water quality. EPA further recommends that information be presented on the long term impacts of each alternative on surface water quality after restoration/reclamation.

#### **4. Groundwater Drawdown**

The DEIS notes that all alternatives were appropriately evaluated with detailed groundwater modeling that included an evaluation of a range of potential impacts. Minor impacts on groundwater flow have been noted across the mine site with several of the alternatives, and some have predicted increases in north-to-south seepage over pre-mining conditions ranging from 11 to 18 percent. Minor decreases in groundwater flow from east to west are reported as occurring under each of the alternatives, and the DEIS states that there are no "discernible impacts" due to mining on groundwater flow across modeled transects outside of the mine site for any of the alternatives. The maximum change in the average levels of onsite wells as a result of mining (among all of the alternatives) was a decrease of 0.3 feet under Alternatives 2, 3, and 8. The DEIS notes that the maximum decrease in water levels on site would have "minimal impact" on the drawdown of water levels off site, resulting in little to no impact on offsite wetlands.

Baseline groundwater flow east to west across the westernmost offsite modeled transect is reported in the DEIS as 89.4 million gallons per day and has shown “negligible change” in modeling under any of the alternatives. As a result of this continued positive flow, modeling results demonstrate no discernible saltwater intrusion into the groundwater.

Regarding permitting, EPA notes that the General Water Use Permit 20013273.000 has been issued by the Southwest Florida Water Management District (SWFWMD) on June 17, 2010, and that Environmental Resource Permit 44029159.001, Dragline Assembly, was approved by SWFWMD on August 16, 2007. Also, Environmental Resource Permit 4029159.000, Test Pit, was approved by SWFWMD on February 22, 2006. Finally, EPA notes that Environmental Resource Permit 0244771-002 was issued by FDEP on November 1, 2010, and Industrial Wastewater Permit FLA663492 was issued by FDEP on January 8, 2010.

#### **5. Wetlands Issues**

Regarding the Alternative Mining Location Analysis, EPA understands that the COE has preliminarily determined that the King Road site contains the Least Environmentally Damaging Practicable Alternative (LEDPA) location. EPA has reviewed the onsite mining alternatives and wetlands analysis contained in the DEIS, and we have focused our review on the information depicted in Table 4-7 (pg 4-33) and Table 5-3 (pg 5-8). EPA notes that Alternatives #2 and #5 appear less desirable for selection as the LEDPA because they result in a net reduction of wetlands function as a result of onsite limestone mining (e.g., Alternative #2 results in a loss of 288 UMAM units and Alternative 5 results in a loss of 161 UMAM units). The DEIS notes that the proposed mitigation would not be sufficient to “off set” the functional loss for Alternatives #2 and #5. After examining Alternatives #3, #4, #6, #7 and #8 and reviewing Table 4-7, EPA notes that the FLUCCS code impacts (functional Hardwood wetlands = 616b + 617 + 621 + 630) clearly demonstrate the superiority of Alternative #7, as it has the least impacts to these important habitats. We note that Alternative #7 has 65 acres of hardwood wetland impacts, while Alternative #3 has 235 acres of hardwood wetland impacts, Alternative #4 has 170 acres of hardwood wetland impacts, Alternative #6 has 144 acres of hardwood wetland impacts, and Alternative #8 has 243 acres of hardwood wetland impacts.

#### **6. Periodic Interagency Review of 404 Permit**

EPA notes from the DEIS that the proposed site would be mined over an approximately 100-year period. EPA’s Section 404 Project Manager recommends that any 404 permit issued should include periodic interagency reviews of mining and mitigation activities at least every 5 years, as well as periodic reporting of mining and mitigation activities on an annual or bi-annual basis to the Jacksonville District’s Regulatory Division.

#### **7. Transportation Issues (Haul trucks)**

The DEIS appropriately notes that traffic increases are also expected throughout the project site and along U.S. Route 19/98, the main arterial road, east of the project site.

Based on the traffic study and the volume of truck traffic turning onto and off of U.S. Route 19 at King Road, the traffic engineering consultant (Lincks & Associates) recommended that left and right turning lanes in excess of 400 feet be established along U.S. Route 19. The FEIS should clarify if the Florida Department of Transportation (FDOT) would support the installation of these turning lanes, and note the responsible entity for financing their construction.

**8. Editorial Comments:**

- Recommend adding the site and mitigation “footprints” to Figure 3-4 on p. 3-8.
- Recommend providing an explanation of why the maximum sustained water table elevation in Figure 3-6 occurs from January – March. Also, recommend providing an explanation for break in data between Nov 07 and Jan 08 in same figure.
- Legends are not clear in Figures 3-17 thru 3-20.
- Figure 3-22 – It is hard to orient to North and South as referenced in the text. Suggest revising figure or text to make clearer.
- Demographics in Table 3-28 – Recommend using more detailed census data (such as census blocks if available) and not just county-level census data.
- The Census Block Groups described on p. 3-86 should be identified in the text.

We appreciate the opportunity to comment on this DEIS. Based upon our review, we have assigned this DEIS a rating of EC-2, meaning we have environmental concerns and have requested additional information for the Final EIS (FEIS). Please include us in any notifications of future interagency meetings, and please forward a copy of the FEIS when it becomes available. If you wish to discuss EPA’s comments, please contact me at 404/562-9611 (mueller.heinz@epa.gov) or Paul Gagliano, P.E., of my staff, at 404/562-9373 (gagliano.paul@epa.gov), or Dan Holliman at 404/562-9531 (holliman.daniel@epa.gov). For wetlands/Section 404 issues, please contact Eric Hughes from EPA’s Wetlands Regulatory Section at 904-232-2464 (Eric.H.Hughes@usace.army.mil).

Sincerely,



Heinz J. Mueller, Chief  
NEPA Program Office  
Office of Policy and Management

cc:

Mr. Eric Hughes, EPA Region 4 Section 404 Project Manager  
Mr. Edward Sarfert, Senior Project Manager, COE, Jacksonville District



318 Baronne Street, Suite 200 New Orleans, LA 70111  
Phone: 504.525.1528 Fax: 504.525.0893

July 11, 2012

Mr. Ed Sarfert  
Senior Project Manager  
U.S. Army Corps of Engineers  
Jacksonville District  
41 N. Jefferson Street, Suite 301  
Pensacola, Florida 32502

**RE: Draft Environmental Impact Statement for the Tarmac Mine King Road  
Limestone Mine Proposed in Levy County, Florida.**

Dear Mr. Sarfert:

On behalf of the Gulf Restoration Network (GRN)<sup>1</sup>, I submit these comments on the Draft Environmental Impact Statement for the Tarmac Mine King Road Limestone Mine Proposed in Levy County, FL (hereinafter Tarmac DEIS).

The Tarmac DEIS analyzes the environmental impacts associated with an application, under Section 404 of the Clean Water Act, to dredge and fill or otherwise directly impact 2,069 acres of wetlands and 1,818 acres of uplands for construction of a limestone mine in Levy County, Florida. The mine is intended to produce commercial grade limestone aggregate for markets within West Central Florida for a period of approximately 100 years.

As the DEIS reflects, the currently proposed action would have significant environmental impacts. In fact, of the alternatives discussed, the applicants current plan will inflict the most significant impacts of all the alternatives discussed which will not be fully mitigated. The GRN would assert that the DEIS:

1. fails to address the regulatory required finding of need over the purported life (100 years) of the mine project;
2. must include a discussion of additional alternatives that are consistent with a reasonable period of demonstrated need (i.e. 20-30 year project life); and
3. fails to fully and adequately analyze the indirect, secondary and cumulative impacts of the mine and any other known or reasonably foreseeable development over the proposed 100 year project life.

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<sup>1</sup> The Gulf Restoration Network is a network of local, regional, and national environmental and public interest groups and individuals dedicated to uniting and empowering people to protect and restore the natural resources of the Gulf Region.

**THE FINAL EIS MUST INCLUDE AN ANALYSIS OF ALTERNATIVES WITH A SHORTER PROJECT LIFE**

The Tarmac DEIS discusses in depth the current “need” for the commercial grade limestone aggregate that will be produced by the applicant’s mine. The Corps defines the project purpose as

to provide a source of affordable construction-grade limestone aggregate including aggregate that meets the FDOT specifications for buildings and infrastructure that meet the long-term public need for high-quality aggregate in west-central Florida.

The DEIS essentially concludes that the absence of sufficient aggregate in Florida meeting Florida DOT requirements establishes the need for the project. The Corps’ discussion, however, fails to address whether the established need will continue over the 100 year projected life of the project.

Under the applicant’s current mining plan, Tarmac intends to mine 25 to 30 acres per year for the next 100 years. Whether or not there is a “need” for the affordable construction-grade limestone aggregate over a reasonable future period (i.e. 20-30 years)<sup>2</sup>, there are no facts or economic data that establish that this need will continue over the 100 year life of this project. In fact, we would argue that 100 years extends far beyond what can be considered a reasonable prediction of long-term need, introducing unacceptable risk and uncertainty. No one knows, nor can they know whether high grade aggregate will still be used for construction of roads or building in 30 years, much less 100 years. In fact, the applicant uses population projections out to 2020, far less than 100 years.

When addressing the issue of need, consideration must be given to the economics of alternative sources of aggregate, such as the lower cost per ton of aggregate that is not mined in Florida; the potential to create a few jobs at the expense of thousands, and the costs and effects to Florida citizens at the end of the mining period, including potential contamination of the aquifer. These long term and often permanent effects to the local environment are largely absorbed by citizens and businesses.

Unlike a housing development project, the destruction of wetlands associated with this mine project will occur incrementally over the 100 project life. As a result, we would argue that the Corps must discuss within the final EIS additional alternatives that shorten to 20-30 years the projected life of the mine. The impacts of such alternatives could be significantly different than those associated with a mine with a 100 year life.

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<sup>2</sup> Webster’s Dictionary defines “long term” as:

- occurring over or involving a relatively long period of time <seeking *long-term* solutions>
- *a* : of, relating to, or constituting a financial operation or obligation based on a considerable term and especially one of more than 10 years <*long-term* bonds>
- *b* : generated by assets held for longer than six months <a *long-term* capital gain>

### **Conditional Use Permit**

The application for a conditional use permit for 100 years is contrary to established practice. Conditional use permitting is transitory, designed for uses not normally contingent on a particular jurisdictional zone which are trying to succeed within a reasonable period of time (not 100 years).

#### **SECTION 404 AND APPLICABLE REGULATIONS PRECLUDES THE CORPS FROM ADOPTING THE APPLICANTS PREFERRED ALTERNATIVE AS ITS OWN.**

As discussed within the DEIS, the applicants preferred alternative, alternative 2, has the highest level of wetland loss and natural resource impacts of any of the discussed alternatives. Under Alternative 2 the applicant will impact 3,900 acres of a 4752 acre site, 2,068.5 acres of which are wetlands of various types. Moreover, the proposed mitigation plan fails to fully mitigate for all of the impacts to wetlands associated with this alternative.

40 C.F.R. § 230.10(a) requires a determination by the Corps of the existence of “a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem.” Although the applicant has chosen Alternative 2 as his preferred alternative, the discussion of alternatives within the DEIS demonstrates that practicable alternatives do exist. In fact, all of the alternative discussed by the Corps within its DEIS are practicable, in that they would meet reasonable long-term (20-30 year) need for aggregate while reducing significantly the impacts to wetlands and other habitats on the site.

Similarly, 40 C.F.R. §230,10(d) requires that “no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.” It is clear from the discussion in the DEIS that there are numerous alternatives that would both meet the applicants purported need for aggregate for a reasonable period of time (20-30 years) and avoid and minimize impacts to wetlands. In fact, Alternative 7 would avoid and minimize to the greatest extent the impacts to wetlands and other habitats while still supporting the production of aggregate at the site for 30 years or more. Alternative 7 is the alternative most often mentioned by local citizens if Alternative 1 – denial of the project and the nearly unanimous choice of those same citizens -- is not chosen as the preferred alternative.

Absent a showing that the need for aggregate from this mine can only be satisfied by the applicants preferred alternative (alternative 2), we would argue that 40 C.F.R. § 230.10(a) and (d) require the Corps to reject Alternative 2 as its preferred alternative and instead choose an alternative that significantly minimizes the mines impacts on wetlands.

#### **THE DEIS FAILS TO FULLY ANALYZE DIRECT IMPACTS**

**1. GROUNDWATER**

The Corps DEIS fails to analyze the impact increasing patterns of drought has on the potential intensification of the impacts of Tarmac's mine on groundwater, using transect modeling for underground water flow through the karst using a 5 year "mean" period, representing an average rainfall for its baseline calendar years from 2004-2008. The Corps did not adequately account for the most recent 20 year period having had the lowest rainfall in the last 120 years of rainfall measurement. The proposed "average" water level drop for onsite wells is less than .3 feet, yet the drop in water level could be up to 10 feet more, well below the potable water sources in the area. This presents a very real danger of net loss and mineralization of groundwater, demonstrating that the use of averages is inappropriate, as it's the lowest water mark that causes damaging impacts to the system.

The mine is proposed to be 120 feet at its deepest point, over 100 feet below sea level. It's unlikely there would be no damage to ground water as a result. Karst model accuracy and adequacy must be seriously questioned.

The applicant has proposed to alleviate the significant dust generated by using 22mgd of spring water. The Corps must evaluate the cumulative effects on spring water flow in the area, already critically reduced by decades of drought and over pumping.

**2. SURFACE WATER/FLOWS**

Surface water flows from Spring Run will be affected by the project, impeding surface water flow across Levy County.

**3. ENDANGERED SPECIES**

The Corps fails to fully analyze the impact of the mine site on Florida panthers, including the importance of the site and its surroundings as a corridor for transient males critical to strengthening the species through genetic diversification – sighting occurrences agreed to by the U.S. Fish and Wildlife Service; as well as the local testimony of recent sightings of mothers with cubs. Under these circumstances, we believe that formal consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act is required.

Additional species impacted include the eastern indigo snake, the wood stork, the manatee and the Florida salt marsh vole. Wood stork rookeries require no noise or disturbance within 600 feet to thrive. Clearly, the activity propose by the applicant will violate this requirement. Negative impacts on the wood stork should, therefore, be addressed within the final EIS.

**4. IMPACTS ON ECOTOURISM**

Tourist revenues for Levy County in 2008 were \$8.1 million dollars, providing a direct economic and jobs benefit to the local communities in the area of the proposed mine site. These visitors come for the fishing, the water, the wildlife and the quiet beauty. The competing demands of the

proposed mine creates a loss of the natural and scenic characteristics of the area. The potential loss of resources includes:

- Permanent changes to wildlife systems,
- Decreasing public use of coastal space,
- Loss of ecological and cultural values essential to the well-being of citizens,
- Loss of wetlands that provide natural ecosystem protection
- Loss of ecotourism dollars that circulate within the county and local communities

**The Draft EIS fails to fully analyze these impacts.**

**5. OTHER**

*Quarry blast impacts* – the south central portion of the mine near Butler Rd is 815 feet from Deer Haven Campground, generating a vibration that is 117-138% of the state threshold. In fact, the local nuisance level of 65db would be exceeded if two pieces of heavy equipment are operating simultaneously near the southern boundary.

*Air Quality* – Dust, gas and diesel emissions will contribute to degraded air quality in the area. The dust is proposed to be watered down with spring water, a critically impacted freshwater source for drinking water, recreation and healthy ecosystems.

*Traffic* – the peak year of 2014 could be further exacerbated by the proposed construction of the Duke/Progress Energy nuclear power plant in Levy County. The changes to the small communities and rural areas of Levy County from these large vehicles running around the clock will be devastating to the way and pace of life for residents and visitors.

*Berms* – the proposed height of the berms is 14 to 18 feet, not adequate for a Category 3 storm surge or above. The impacts of overtopping of the berms could be significant. These potential impacts must be fully considered in the final EIS.

*Sea Level Rise* - The DEIS projects a sea level rise of 0-5.7 feet over the life of the project. This (minimal) projection would cause inundation at the western part of the project. The potential impacts of inundation must be fully considered.

All of the above discussed potential impacts must be fully analyzed within the final EIS.

**THE DEIS FAILS TO FULLY CONSIDER INDIRECT IMPACTS OF THE MINE**

NEPA requires that within an EIS the Corps include a full consideration of all secondary and indirect impacts of a proposed activity. The CEQ regulations require that an agency's discussion of environmental impacts include analysis of indirect impacts as well as direct impacts. Indirect effects are those effects “which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” 40 C.F.R. § 1508.8(b).

Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Id. (emphasis added). The Corps' own regulations also require consideration of indirect impacts. 33 C.F.R. § 325, App. B ¶ 7(b)(3) (NEPA analysis should include indirect impacts).

In this instance, the Corps has wholly failed to include any real consideration of impacts in the DEIS. The final EIS must address this deficiency by discussing all reasonably foreseeable indirect impacts of the current permit, including but not limited to:

- (i) any and all environmental impacts of increased development stimulated by the mine, including equipment suppliers, truck stops or vehicle maintenance facilities, restaurants and the like;
- (ii) any and all environmental impacts associated with increased truck traffic and other traffic patterns or the level of traffic on local roadways, include future road maintenance, road widening or other reasonably foreseeable road work; and
- (iii) any and all environmental impacts of increased residential or commercial development stimulated by the proposed project, such as the construction of restaurants or businesses serving workers at the mine site; whether the impacts of the proposed project is contrary to the Levy County Coastal Management Element in its comprehensive plan, e.g. allowing for additional growth in a coastal high hazard area; increasing growth and development creating disturbance in coastal marshes, wetlands and sea grass beds;

#### CUMULATIVE IMPACTS

A cumulative impact is “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.” Fritiofson v. Alexander, 772 F.2d 1225, 1245 (5th Cir. 1985). Within an EIS the Corps must fully analyze the impacts of all reasonably foreseeable development or activities stimulated by the proposed project that have had or are expected to have impacts in the project area and the surrounding area, and the overall impact that can be expected if the individual impacts are allowed to accumulate. An action may be significant in its own right or it may be significant if “the action is related to other actions with individually insignificant but cumulatively significant impact.

In this instance, the Corps' analysis of cumulative impacts is limited to those projects, such as other mines, road work and a proposed power plant(s) that are currently known to the Corps. There is no discussion of projects being currently proposed, designed or discussed for the area over the 100 year life of the proposed mine or any reasonably foreseeable development that might be expected to occur in Levy County over the next 50-100 years.

The Fifth Circuit has set out the kind of information that this "broader analysis" must include:

Given the CEQ regulations, it seems to us that a meaningful cumulative-effects study must identify: (1) the area in which effects of the proposed project will be felt; (2) the impacts that are expected in that area from the proposed project; (3) other actions -- past, proposed, and reasonably foreseeable -- that have had or are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; and (5) the overall impact that can be expected if the individual impacts are allowed to accumulate.

Fritiofson, 772 F.2d at 1245 (emphasis added). N.R.D.C. v. Hodel, 865 F.2d 288, 298-300 (D.C. Cir. 1988).

#### INCORPORATION OF ANALYSES AND COMMENTS OF THE WITHLACOOCHEE

Comprehensive analyses of the proposed mine development and its impact have been completed by members of the Withlatchoochee Area Residents who have greater expertise than the GRN on issues of specific concern regarding this project. We incorporate herein by reference the comments submitted by the Withlatchoochee Area Residents and its members.

Respectfully submitted,

Cathy Harrelson  
Florida Program Coordinator  
Gulf Restoration Network  
231 44<sup>th</sup> Ave NE  
St. Petersburg, FL 33703  
727-415-8805  
[cathy@healthygulf.org](mailto:cathy@healthygulf.org)



**CITY OF DUNNELLON**  
20750 RIVER DRIVE  
DUNNELLON, FLORIDA 33431  
(352) 465-8500  
FAX (352) 465-8505

**Via email & website**  
July 11, 2012

Mr. Edward Sarfert, USACE  
Regulatory Division  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502-5794

Dear Mr. Sarfert:

The City of Dunnellon is a small city located in southwest Marion County along State Hwy 41 and County Road 40. Population within the City is 1,733 and approximately 40,000 in the surrounding area.

Dunnellon is a bedroom community to Ocala and home to many retirees. The local economy is dependent on eco-tourism. The Rainbow River and Withlacoochee River converge in Dunnellon. Over 200,000 visitors a year visit these rivers to enjoy fishing, canoeing and tubing.

In 2004, Dunnellon's citizens developed a Strategic Vision for their city. The primary goal is to create and support a walkable, pedestrian friendly community that is sustainable.

In support of the vision the City Council has installed red light cameras resulting in slower traffic. The City Council has also adopted a Bicycle/Pedestrian Master Plan based on citizen input. Additionally, the City Council has established a Streetscaping Committee to begin improvements on Pennsylvania Avenue (CR 484).

The proposed Tarmac King Road Limestone Mine raises concerns for the City of Dunnellon. In Section 3.14.5 of the Draft Environmental Impact Statement (DEIS) it is reported that the distribution of crushed rock by truck would cover a 70 mile radius. The City of Dunnellon is located within this 70 mile radius. Heavy truck traffic as proposed by the mine would be devastating to the City of Dunnellon.

County Road 40 is the west entrance into Dunnellon. Although it is noted in Section 4.15.2.2.1 of the DEIS that no truck traffic was assumed to travel on CR 40 because it currently has a weight restriction of 10,000 pounds, the City is concerned that the weight limit will be increased allowing trucks to use the road.

Mr. Edward Sarfert, USACE  
July 11, 2012  
Page 2

When one reads the DEIS there is an implication that weight limits will be increased on CR 40, since it is noted that the existing weight restrictions are "current". If CR 40 cannot be used, then why did Links and Associates study it for capacity and what routes will trucks use to get to Marion County?

If the weight limits are increased allowing trucks to use CR 40 then the DEIS does not follow the NEPA. Truck traffic in Dunnellon would adversely impact two school zones, a National Register Historic District, property values and the pedestrian/bicycle friendly environment of Dunnellon.

Dunnellon Middle School is located near CR 40 as well as a private school. Truck traffic would interfere with school traffic and children walking and bicycling to school. This would create a safety hazard for school children in the area.

Dunnellon's Historic District is accessed by a section of CR 40 which also leads downtown. The district, listed on the National Register of Historic Places, was originally residential and is now a mix of residential and commercial space. The corridor also hosts several annual community-wide events such as Boomtown Days in the spring and Jazz Up Dunnellon in the fall. The addition of heavy truck traffic would be a negative impact to this district. The DEIS does not address the historic and therefore does not follow the National Historic Preservation Act of 1966.

Property values along the truck route will decrease as truck traffic increases. Heavy truck traffic generates noise, dust and fumes. A major study of noise costs conducted for the 1982 Federal Cost Allocation Study "assumed a 0.4 percent decrease in the value of a housing unit for each dBA (Leq) increase over a threshold value of 55 dBA." (TranSafety).<sup>1</sup> The DEIS did not address the loss of property values.

Dunnellon is a bicycle/pedestrian friendly community. The city promotes a safe environment for its pedestrians and bicyclists as demonstrated in the master planning and street improvements. Heavy truck traffic is hazardous to pedestrians and bicyclists. The noise, fumes and dust are counterproductive to the safe environment the city is achieving. Routing trucks through Dunnellon would be devastating to the quality of life now enjoyed by its citizens.

Expertise in preparing the DEIS as listed in Chapter 9 does not include professionals in historic preservation and property appraisal. The DEIS does not address the adverse impacts to Dunnellon which is within the 70 mile radius nor does it provide mitigation to those impacts.

The final EIS needs to address the adverse impacts to Dunnellon and provide mitigation for the impacted school zones, historic district, loss of property value and loss of quality of life for all the citizens of Dunnellon.

With best regards,



Lisa Algieri,  
City Manager

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<sup>1</sup> <http://www.usroads.com/journals/p/rej/9710/re971004.htm>

Tarmac King Road Limestone Mine – ER 12-348



**United States Department of the Interior**

**OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
Richard B. Russell Federal Building  
75 Spring Street, S.W.  
Atlanta, Georgia 30303**



ER 12/348  
9043.1

July 11, 2012

Edward Sarfert  
USACE, Regulatory Division  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502-5794

Re: Comments on the Draft Environmental Impact Statement (DEIS) for the Tarmac King Road Limestone Mine – Levy County, FL

Dear Mr. Sarfert:

The U.S. Department of the Interior (Department) has reviewed the subject DEIS and provides the following comments. The DEIS provides quality information and detail for water and engineering aspects of the project; however, the biology sections are less informative. We suggest that the Final EIS include information on life history, local populations, reproductive status of wildlife and fish in the affected area. This information would enable the reader to better understand the implications of the project.

Additionally, the Tarmac King Road Limestone Mine project is located adjacent to the Waccasassa Bay Preserve, a Land and Water Conservation Fund site. Please consult with Mary Ann Lee with the Florida Department of Environmental Protection at 3900 Common Wealth Blvd., Mail Station 585, Tallahassee 32399-3000 or via phone on (850) 245-2501 concerning potential impacts to the Preserve.

Thank you for the opportunity to review and comment on the DEIS. If you have any questions concerning our comments, please contact Gary LeCain at (303) 236-1475 or via email [gdlecain@usgs.gov](mailto:gdlecain@usgs.gov) or Anita Barnett at 404-507-5706 or via email [anita\\_barnett@nps.gov](mailto:anita_barnett@nps.gov). I can be reached on (404) 331-4524 or via email at [joyce\\_stanley@ios.doi.gov](mailto:joyce_stanley@ios.doi.gov).

Tarmac King Road Limestone Mine – ER 12-348

Sincerely,



Joyce Stanley, MPA  
Regional Environmental Protection Assistant

for

Gregory Hogue  
Regional Environmental Officer

cc: Jerry Ziewitz – FWS – Region 4  
Brenda Johnson - USGS  
Anita Barnett – NPS  
Chester McGhee – BIA  
OEPC – WASH

**I.21.5 Transcript from Draft Tarmac King Road Limestone Mine EIS Public Meeting**

1 PROCEEDINGS: U.S. ARMY CORPS OF ENGINEERS PUBLIC  
2 SCOPING MEETING

3 RE: Draft Tarmac King Road Limestone Mine  
4 Environmental Impact Statement

5 DATE: May 31, 2012

6 TIME: 7:00 p.m. - 9:15 p.m.

7 LOCATION: INGLIS COMMUNITY CENTER  
8 137 Highway 40 West  
9 Inglis, Florida 34449

10 REPORTED BY: SHANNON CARLTON, RPR  
11 Court Reporter and Notary Public,  
12 State of Florida at Large

13 APPEARANCES: ED SARFERT  
14 U.S. Army Corps of Engineers

15 OSVALDO COLLAZO  
16 U.S. Army Corps of Engineers

17 JIM HOLIAN  
18 Meeting Facilitator

19

20

21

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22 JOY HAYES COURT REPORTING  
23 Official Court Reporters  
24 407 Courthouse Square  
25 Inverness, Florida 34450  
Bus: (352) 726-9411  
Fax: (352) 726-4451

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P R O C E E D I N G S

1  
2 MR. HOLIAN: Good evening. We'd like to go  
3 ahead and get started. I'd like to welcome you to  
4 the Inglis Town Center, public meeting for the  
5 Tarmac King Road Limestone Mine Environmental  
6 Impact Statement.

7 When you registered you were given a draft  
8 agenda. There's a minor change to the draft  
9 agenda. Our facilitator had a family emergency  
10 and had to back out, so I've been asked to fill in  
11 for her and we wish her well.

12 My name is Jim Holian and I will serve as the  
13 moderator for this meeting. I look forward to an  
14 informative, pleasant and orderly evening with you  
15 all. I was here for the scoping meeting. I see  
16 some familiar faces. It's been four years, but my  
17 memory's okay.

18 Before we get started I'd like to go over a  
19 few rules and explain how the meeting is to  
20 progress so that everyone gets an opportunity to  
21 hear and speak if they so choose. And the first  
22 question is I'm assuming everyone can hear me back  
23 there? Sometimes the drinking fountain and things  
24 kick on and it's harder to hear, so we'll try to  
25 talk over that when it does.

1           If you have not signed up at the registration  
2 table, it was pretty busy there for a little  
3 while, please do so. It's our opportunity to get  
4 you material if you request it. We keep a record  
5 of who attends these meetings. So if you have an  
6 opportunity to go back and register, that's great.

7           If you also would like to speak, we would like  
8 you to sign up on the speaker's form and we will  
9 call everyone in order that they signed up at  
10 another part of the meeting after the  
11 presentation.

12           Some of you have already turned in written  
13 comments that you had as you came in the door.  
14 You can do that. There is a bin on the left. If  
15 you didn't do that, you can set them up here on  
16 the table after the meeting. You can make  
17 comments during the meeting.

18           If you have -- are not going to speak  
19 publically, I know some people don't like to speak  
20 publically, they would rather do it in writing, and  
21 that's fine. Everybody's comments will be taken  
22 and put into consideration when the final EIS is  
23 issued.

24           So why are we having this public meeting?  
25 This public meeting is another step in the

1 National Environmental Policy Act, NEPA, for  
2 federal actions such as the mine and the permit  
3 that the Corps of Engineers will be responsible  
4 for possibly issuing. Public comments, verbal and  
5 written, will be taken into account during this  
6 entire period, as well as any comments between now  
7 and July the 11th.

8 There is a number of opportunities for you to  
9 give public comments. You can do them through the  
10 website and the website will be posted up here  
11 (indicating). You can do them through e-mail, you  
12 can do them through this process, or a phone call.  
13 So we want to hear your voice and we want to hear  
14 your concerns.

15 Now, as the moderator, I have a job as the  
16 moderator to be objective, to establish a  
17 respectful and fair environment for you all as  
18 participants and show no favoritism towards  
19 people's opinions. I also have to ensure that you  
20 have an opportunity to express your concerns. I  
21 also have a requirement for the public to provide  
22 comments on this draft and whether it be about the  
23 alternatives, the proposed action, or whatever.

24 There will be several different things we have  
25 to take into account here tonight, rules that we

1 must follow as a group so that everyone gets a  
2 chance. First, you will hear from the Corps of  
3 Engineers. Osvaldo Collazo will start off with an  
4 introduction and he will then turn it over to  
5 Mr. Ed Sarfert who is the project manager from the  
6 Pensacola Corps office.

7 He will give a presentation on the draft EIS  
8 and go through the process and go through some of  
9 the analysis, as well as some of the mitigation  
10 things that have come up during the environmental  
11 analysis. Then after the presentation is done, we  
12 open the meeting up for the public comments and  
13 that's where you come in.

14 We will go with the people who signed up first  
15 and call them by name. I will do that and we ask  
16 that you come forward and speak your name clearly  
17 because we have a court reporter who will be  
18 recording all the comments for the record. And  
19 two favors: One, don't hold it against me if I  
20 can't get your name pronounced correctly. And,  
21 two, if it's a long name or a difficult spelling,  
22 turn around and spell it to her so that she can  
23 get it correctly in the record.

24 And then you have three minutes to give your  
25 comment. I have a series of cards here and a

1 yellow card I will show when you have one minute  
2 left and a red card when you have used your three  
3 minutes. So please finish up in a hurry after  
4 that just out of respect for other people who have  
5 signed up.

6 It doesn't mean you're done. It means that  
7 allow everyone to get an opportunity to speak and  
8 then when everyone is done we will open it back up  
9 again. If you have another comment or issue you  
10 would like to speak about, you can come back up.  
11 We will call you up, but we want to make sure  
12 everybody has a chance to speak.

13 And I believe that's all the rules that I had  
14 to go over at this time. So I'd like to turn it  
15 over to Mr. Collazo for opening marks.

16 MR. COLLAZO: Welcome again. I'm Osvaldo  
17 Collazo from the Jacksonville office of the Corps.  
18 It was four years ago at this same location that  
19 we had the scoping meeting and we sought your  
20 concerns and issues in regards to the proposed  
21 project and based on that we do our studies and  
22 this is our report back to you.

23 Mr. Ed Sarfert, who's our senior project  
24 manager, and he's been involved with this project  
25 since its inception is going to give you a

1 presentation on the NEPA process and also the  
2 draft EIS.

3 (Whereupon, there was a presentation on the  
4 NEPA process and draft EIS by Mr. Ed Sarfert and  
5 then the public comment session commenced and the  
6 following was heard:)

7 MR. HOLIAN: Thank you, Ed. One other comment  
8 on that is the presentation you just saw will be  
9 put on the website tomorrow. So if you would like  
10 to review the slides again and go back through  
11 your minds what next is coming, it'll be up on the  
12 website by tomorrow morning.

13 Now, we start the formal comment period which  
14 is your opportunity to come forward and the court  
15 reporter will begin her process. She didn't do  
16 this, the presentation, but now she starts up  
17 again.

18 So we have 11 people who have signed up at  
19 this point to speak. If you came a little bit  
20 late, I saw a couple of people walk in, you still  
21 have an opportunity. You can go back and sign up.  
22 We'll just wait until the end. I will call you up  
23 at the end once we've given the first group of  
24 people an opportunity to speak.

25 Once again, I will put the microphone down

1 there. We would prefer you pick the microphone up  
2 and speak into it so that she can hear, we can  
3 hear, and the people behind you because you'll  
4 have your backs to them can hear. Speak clearly  
5 your name and your affiliation if you so choose to  
6 affiliate yourself.

7 And pay attention, when you get to within two  
8 or three minutes of speaking, you'll see me put up  
9 the yellow card meaning you have one minute left  
10 and then the red card asking you to wrap it up.  
11 Your comments are extremely important, so please  
12 don't be shy. And the first person is Jack  
13 Schofield.

14 COMMENTER SCHOFIELD: My name is Jack  
15 Schofield. I'm a citizen of the town of  
16 Yankeetown and my comments are 4 minutes and  
17 23 seconds, so I'll stop at three minutes and come  
18 back.

19 I would like to thank the Army Corps of  
20 Engineers in doing a thorough review of the  
21 citizens' input and including it in the draft EIS.  
22 There are many points that when the cumulative  
23 impact is considered, the Army Corps of Engineers  
24 should only consider the option of no mining.

25 Economics and need of the Florida Department

1 of Transportation-approved aggregate was one of  
2 the key points that the applicant stated warranted  
3 the permitting of this mine. When considering  
4 economics, a key factor is the cost to the  
5 citizens of Florida who, in fact, through taxes,  
6 gas taxes, and assorted fees, licenses, and tolls  
7 in the state of Florida is ultimately buying this  
8 aggregate.

9 There is the economics of importing the  
10 aggregate from outside the state, whether it is  
11 Alabama, Mexico or the Caribbean, that should be  
12 given more consideration. What was not considered  
13 thoroughly was the Citrus Port project that  
14 currently has shipped aggregate via barge. The  
15 proposed barge transportation from this port on  
16 the Cross Florida Barge Canal could provide an  
17 excellent opportunity to import aggregate at  
18 reasonable costs.

19 In the study it showed how aggregate from  
20 outside the country and state actually cost less  
21 per ton than that being mined in Florida. The one  
22 caveat to this was the shipping costs from the  
23 Port of Tampa, Jacksonville, Port Canaveral would  
24 eat up any cost savings.

25 One factor that was not explored was again the

1 Port of Citrus which currently has been shipping  
2 lime rock out of the area to the Tampa area. The  
3 Port of Citrus which has already been designated a  
4 port has just in the past two years taken a new  
5 life. If aggregate were to be shipped into the  
6 Port of Citrus, this would provide a cost savings  
7 to the citizens of Florida while almost totally  
8 minimizing and eliminating all other negative  
9 impacts.

10 The report states the cost from Mexico in 2010  
11 was \$6.52 per ton, the Caribbean \$8.53 per ton,  
12 and Alabama \$8.12 per ton. The cost per ton in  
13 Florida in 2010 was \$11.77. Thus, importing would  
14 cost saving -- would be a cost savings to the  
15 citizens.

16 In the report it said that transportation  
17 costs from the proposed King Road Mine was \$6.00 a  
18 ton. If shipped from the Port of Citrus, which is  
19 approximately seven miles south, it could be  
20 expected the shipping costs would be similar.

21 It would also be closer to existing rail lines  
22 as well as the proposed Suncoast Parkway which  
23 will be approximately two miles south of the Port  
24 of Citrus. This also would create far better  
25 paying jobs and larger numbers of new employment

1 than what the applicant has proposed.

2 With economics being a driving force to so  
3 many facets of our lives, it could be that by  
4 importing this product at reduced costs, the  
5 additional costs that the taxpayers would be faced  
6 with at the end of mining would also be saved.

7 Once mining is completed, the applicant would  
8 turn the land over to the citizens of Florida.  
9 Thus, all costs related to maintaining berms,  
10 water quality, and management of these new state  
11 lands would not be required if sourcing the  
12 aggregate from outside the state would be the  
13 alternative means.

14 If this were the approach to take, we would  
15 eliminate the potential of drawdown and  
16 contamination of our aquifer, eliminate the need  
17 for wetland mitigation which is an interesting  
18 term since it does not mean wetlands will be  
19 increased, but only that wetlands will be -- other  
20 wetlands will be preserved to make up for the lost  
21 of these wetlands exposed to mining impacts.

22 Rebuilding wetlands is not a proven science  
23 since many wetlands renewals have not succeeded in  
24 creating a healthy new wetland. And I'll stop  
25 right there. That's probably about it.

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MR. HOLIAN: Right on the money.  
COMMENTER SCHOFIELD: I'll come back later.  
MR. HOLIAN: Thank you, Mr. Schofield.  
COMMENTER SCHOFIELD: Thank you.  
COMMENTER RUPPERT: I'm the next speaker and  
I'm going to give mine to Jack.  
MR. HOLIAN: You are Ruth Ruppert? Yes?  
COMMENTER RUPPERT: Yes.  
UNIDENTIFIED SPEAKER: Also, if you want to  
turn in a transcript at the end to the court  
reporter to help ensure her accuracy, that's  
helpful.  
MR. HOLIAN: You have another three minutes.  
COMMENTER SCHOFIELD: Another three minutes,  
okay. It will only take a minute and 23 seconds.  
MR. HOLIAN: Slow down.  
COMMENTER SCHOFIELD: Thank you. The UMAAM  
scores mentioned when you carefully study the  
applicant's submission to that of the state, the  
applicant scores the area to be affected by mining  
lower than many of the FDEP studies. In the  
state's report, several times it is mentioned that  
this area is -- of the proposed mine, there are  
many -- there are some of the most pristine  
wetlands in the nation, if not the world.

1           We, as a country, have a history of destroying  
2 wetlands. So if we have some of the most pristine  
3 wetlands in the world, why would we not look  
4 elsewhere especially if the cost to import would  
5 be less than -- the cost to the citizens would be  
6 less in the future?

7           And you got to remember, this thing's going to  
8 last for eternity. The berm's going to be there  
9 for eternity. Somebody's going to have to pay for  
10 it. It's not going to be the applicant. The  
11 state's going to get it, people in this room, our  
12 people will be paying for it.

13           Habitat. I'd also like to report -- look at  
14 the angling report and that mentions where the  
15 pristine wetlands are in there and it's mentioned  
16 in every one of their reports.

17           Habitat. What was mentioned in passing was  
18 the sighting of protected species, the Wood Stork,  
19 Roseate Spoonbill, and the eastern indigo snake.  
20 While it is mentioned in the report that the  
21 closest nesting is in northern Citrus and northern  
22 Levy County, there is also a colony of both the  
23 species nesting just five miles to the southwest  
24 on Bennett's Creek west of Yankeetown.

25           I'd be glad to take you in my pontoon and show

1 you probably between Roseates and Wood Storks,  
2 probably a hundred of both species. So I think  
3 there's probably more going in there than we can  
4 imagine.

5 There also has been sightings of black bear on  
6 Pumpkin Road in the area of the mine and also  
7 on -- I have it on the back here. I have  
8 photographs for you taken by a hunter that hunts  
9 off Butler Road and these were taken in 2011.  
10 And this has also been reported by the state  
11 foresters. This must be considered more  
12 thoroughly since these animals, as well as the  
13 eastern indigo snake, are on the federal and state  
14 endangered or threatened species lists.

15 While there may be a need in the distant  
16 future, there is no immediate shortage from  
17 existing mines in the state. There is time to  
18 prepare for when the demand may one day outstrip  
19 supply. Take a step back and a deep breath and  
20 rather than permitting this mine, look at what  
21 could be the most practical and economic way to  
22 solve this issue of need.

23 Today there is no apparent shortage and none  
24 for the foreseeable future. More importantly  
25 there's a potential future costs to the citizens

1 who in the end will carry the burden 20, 50, a  
2 hundred or a thousand years from today. Thank  
3 you.

4 (Applause.)

5 MR. HOLIAN: Our next speaker that signed up  
6 is Noel Desmond.

7 COMMENTER DESMOND: Good evening. My name is  
8 Noel Desmond. I'm a resident of Levy County for  
9 32 years. For the past 11 months, several other  
10 citizens and myself have been conducting a panther  
11 survey in the area here and it has extended all  
12 the way from Inglis/Yankeetown or northern Citrus  
13 County to Manatee State -- Manatee Springs State  
14 Park.

15 We sent out fliers and to date we have 18  
16 reports of Florida panthers. We have one report  
17 of a female with cubs reported by a Ms. Jody and  
18 Terry Pitts out of Inglis. This was in 2005. The  
19 reports that we have stem anywhere from 1998 all  
20 the way to 2012. As I related to someone in here  
21 earlier, my own property which I owned in 1980,  
22 I've seen myself, and I did not file a report  
23 because I'm taking these reports, of a panther  
24 with three cubs on my own property.

25 I'm well-versed in big cats. I was considered

1 an expert in big cats and have given testimony in  
2 court on big cats and rare and endangered species.  
3 I was an importer and exporter of the same. We  
4 believe that there is a breeding population of  
5 Florida panther here in Levy County, extending  
6 from Citrus County all the way north.

7 Now, we've also had some report through the  
8 news media over the past month of another cat  
9 being seen farther in Citrus County in a  
10 residential area. I presume it was killing and  
11 eating pets and needed to be removed. That was  
12 reported.

13 I would like the Corps of Army Engineers to  
14 give some weight to these reports. These are not  
15 people who are unfamiliar with the wildlife of  
16 this area. Some of these families have been here  
17 for a hundred years or more. They are woodsmen,  
18 they are hunters, they've been in the woods most  
19 of their life and they can tell you from being in  
20 the woods, they know what they're seeing.

21 So I understand that the US Fish and Wildlife  
22 Service opinion is that what we're seeing is  
23 either a bobcat or male panthers, but personally I  
24 think the US Fish and Wildlife Service is wrong  
25 about their opinion.

1           So, please, give this some weight of the  
2 information we've given you. Hopefully in the  
3 future we will be able to give the photographic  
4 proof because we have cameras in the field. I  
5 thank you very much for your time.

6           MR. HOLIAN: Thank you.

7           (Applause.)

8           MR. HOLIAN: Our next speaker is Dan Hillard.

9           COMMENTER HILLARD: Good evening. I'm Dan  
10 Hillard. I'm representing the Withlacoochee Area  
11 Residents. I will be brief with this. We have  
12 submitted a summary of tonight's presentation,  
13 five copies, you can review that in the finer  
14 detail. And we will re-forward additional written  
15 comments within the specified period.

16           We have a number of concerns about this  
17 project. One of the big ones is the life of the  
18 project as proposed. A hundred years makes  
19 uncertainty implicit about the future of this  
20 project. We think the project is extraordinarily  
21 vulnerable to tropical storm impacts and the range  
22 of tropical storms for Category 3 storms, you got  
23 approximately 22 storms in a period of record that  
24 struck this region of the coast.

25           In the discussion about the protecting from

1 that particular action, there's a -- we have berms  
2 proposed of 19 foot, 18 feet deep. We don't  
3 believe that that is a credible defense against  
4 tropical storm surge and we recognize Category 3  
5 starts to approach the threshold of extreme  
6 events.

7 Category 1, 2, tropical storms is kind of  
8 routine and that is an issue because these pits  
9 will be vulnerable to wave action in the interior  
10 and the exterior. We know that the engineer's  
11 steel concrete structures that were intended to  
12 protect New Orleans in the landfall Category 3  
13 storm Katrina did not work. They were designed  
14 for that standard.

15 The DEIS suggests a range of zero to  
16 5.7 feet. It further suggests that will cause  
17 inundation of the western part of the project  
18 area. In our opinion, this reasonably requires  
19 selection of an alternative that is not at risk  
20 from that factor because essentially it would be  
21 inundated and you have a tropical storm or cyclone  
22 risk.

23 We also note that there appears to be a little  
24 legal conflict between the 19-foot Levy standard  
25 and the Levy County code. I realize you're not in

1 the business of enforcing that, but Levy County  
2 Code Section 57.19 limits berms to a maximum  
3 height of ten feet above grade. It also requires  
4 that a berm should have a unrelated surface at or  
5 below 10 feet above grade.

6 We have extensive discussions in the summary  
7 about the needs and alternatives discussion and I  
8 would ask you to look at that for further  
9 evaluation. To be clear, W.A.R supports  
10 Alternative 1 which is the no mining option.

11 We recognize that you are constrained by code  
12 and statute of this process. Should the Corps  
13 feel compelled to pick another alternative in this  
14 process, they would logically run into our -- from  
15 our perspective anyway, three through eight of the  
16 alternatives would all present less risk than  
17 Alternative 2. They would still provide aggregate  
18 based for the need of that material.

19 Due to the uncertainty created by the length  
20 of this project, if the Corps is propelled to  
21 select one of these, we suggest Alternative 7.  
22 Thank you for your time.

23 MR. SARFERT: Thank you.

24 (Applause.)

25 MR. HOLIAN: Our next speaker is Betty Berger.

1 COMMENTER BERGER: I had a tickle in my  
2 throat, so let's see if this works. Tarmac is  
3 owned by Titan, a Greek company, and is against  
4 the public interest of Levy County. Their first  
5 mine pit is planned at the headwaters of Bone  
6 Slough and affects Spring Run where it joins just  
7 west of the site and will prevent any water from  
8 flowing across Levy County into the Gulf.

9 SWIFTMUD states the area south of the  
10 hydrologic divide, and I have a graph in here from  
11 SWIFTMUD, is fed only by rainfall and it's not  
12 raining. Tarmac water consumption is permitted at  
13 a low-gallon rate, but their rock-washing aquifer  
14 use is 22 million gallons of water a day.

15 There are about 30 public water supplies,  
16 including Inglis and Yankeetown, drawing from that  
17 part of the aquifer, as well as many private  
18 wells. Progress Energy states great water  
19 withdrawal will be needed for the nuclear -- Levy  
20 nuclear plants.

21 The large Ogallala Aquifer due to over-pumping  
22 requires water to be trucked into many areas,  
23 covered eight states, and because they were  
24 raising corn and irrigating it to make ethanol,  
25 they used up all their water. No reason to open

1 Levy County up to such disaster.

2 Plum Creek owns 70 percent of Levy County.  
3 This first special exception is a foot in the  
4 door. If it's granted they can lease to  
5 additional mines. Tourists are the economic  
6 benefit of Levy County. Carol McQueen states that  
7 tourists for 2008 Levy revenues were \$8,100,000.  
8 Tourists don't come to look at open lime rock  
9 pits, but to see the trees, the water, and beauty  
10 of the Nature Coast.

11 Tarmac traffic reports states 2,000 rock  
12 trucks will haul rock, 1,000 in and 1,000 out,  
13 with 80 percent going south through Inglis. EPA  
14 warns about diesel engine exhaust causing cancer.

15 It's against the state water policy and the  
16 Levy County water plan. Data summarized in the  
17 plan are water supply, source protection; water  
18 quality, surface and groundwater -- note: Washing  
19 the lime rock adds the pollutant turbidity to  
20 water returned to the Florida aquifer -- flood  
21 protection, floodplain management; and natural  
22 water -- natural systems, ecosystem protection,  
23 minimum flows and levels of the Levy County water  
24 plan.

25 It's against the Coastal Zone Management Act

1 of 1972. Competing demands have resulted in loss  
2 of living marine resources, wildlife, permanent  
3 and adverse changes to ecological systems,  
4 decreasing open space for public use and shoreline  
5 erosion.

6 Important ecological, cultural, historic and  
7 esthetic values in the coastal zone which are  
8 essential to the well-being of all citizens are  
9 being irretrievably damaged or loss. Special  
10 natural and scenic characteristics are being  
11 damaged by ill-planned development that threatens  
12 these values. Coastal state also means bordering  
13 on the Gulf of Mexico.

14 Environmental Protection Act of 1971 provides  
15 a vehicle for citizen enforcement of laws, rules,  
16 regulations for the protection of air, water, and  
17 other natural resources of the state. See you  
18 later for the rest of this.

19 (Applause.)

20 MR. HOLIAN: Our next speaker is Richard Neal.

21 MR. NEAL: Richard Neal, N-E-A-L. I would say  
22 gopher turtles, you just kind of dismissed the  
23 gopher turtles as if they're not impacted, but the  
24 last I heard is there's 111 or 135 species that  
25 are -- rely on -- bugs that rely on these gopher

1 turtle nests. So just to say that, you know, we  
2 don't -- it's not impacting them, it's not true  
3 because it affects the whole ecosystem. It  
4 affects the gophers, frogs. You know, there's a  
5 lot of things.

6 My other thing is if we berm all the way  
7 around this thing and somewhere in this  
8 hundred years we're going to get this storm and  
9 we're going to turn this big thing into nothing  
10 but a big lake and there will be no critters left  
11 in there. They're either going to drown or be  
12 displaced.

13 And then this gravel or whatever it is is  
14 going to be disbursed all over these wetlands  
15 we're trying to protect and it's just going to  
16 turn into a big chalky lake when it all dries up.  
17 So somewhere in this hundred years, that whole  
18 area, 4,000 acres, is going to turn into a chalk  
19 pit.

20 And as far as these trucks, I didn't know that  
21 the trucks interest you going north or south. I  
22 would think if I were running an operation like  
23 this, I'm saying, Levy County, don't worry about  
24 me, I'm going to Citrus County with these trucks.  
25 And what keeps them from taking a left as soon as

1 they -- this thing is approved? Levy County just  
2 kind of ignores it now because it's not going to  
3 impact us, it's all Citrus County, but as soon as  
4 you guys let go, I'm turning left.

5 (Applause.)

6 MR. HOLIAN: Our next speaker is Renate  
7 Cannon.

8 COMMENTER CANNON: Good evening. My name is  
9 Renate Cannon. That's spelled R like Richard, E  
10 like echo, N like Nancy, A like Anton, T like Tom,  
11 E like echo. Last name Cannon like the big  
12 weapon.

13 I would like to respectfully offer the  
14 following comments: I would personally like to  
15 see the least damaging alternative. Due to  
16 medical reasons and hospitalization, I wasn't able  
17 to read the last report, but I did read every line  
18 of the presentation of everything in person and I  
19 attended all the other meetings in Levy County  
20 before the Levy County Commission, etc.

21 And the thing what upsets me the most is the  
22 100-year duration of semis. And whichever  
23 alternative, I can't remember which of the  
24 numbers, that suggested the 30 years, that is what  
25 if the applicant, naturally this is a democracy,

1 has a right as long as he stays within legal  
2 parameters to have a business, then that would  
3 possibly be the most desirable compromise.

4 Besides that, the next major issue which I  
5 also conveyed to the applicant is for me the  
6 impact on the groundwater of lakes. We are  
7 dealing with the Southwest Water Management  
8 District, which I'm sorry to say, that does not  
9 have the most wonderful reputation for protecting  
10 water. And not only that, the state agency which  
11 is the Department of Environmental Protection, I  
12 personally call it the Department of Environmental  
13 Pollution because they have not given me any  
14 reason to feel otherwise.

15 I have been to the Suwannee River Water  
16 Management District area of Levy County and I  
17 attend all their meetings and they constantly  
18 issue more permits no matter what is available.  
19 If we get sinkholes due to excessive wastewater,  
20 that may cause soil water intrusion. And then the  
21 proximity to the proposed nuclear power plant is  
22 most unfortunate. That's all I would like to say,  
23 gentlemen. Thank you.

24 (Applause.)

25 MR. HOLIAN: Our next speaker is Sally Price.

1 COMMENTER PRICE: Good evening. Sally Price.  
2 I call myself pre-BC. I was here before the barge  
3 canal. I've been here over 50 years. My property  
4 backs up to the Hollinswood property. So I'm real  
5 familiar with mining, shaking, damage to the  
6 houses and the noise pollution.

7 Anyway, I'd like to start off, I've got just a  
8 list of things to run through fast before the red  
9 light comes on. I agree with everybody that has  
10 spoke so far. They're awesome people.

11 Panthers. Having been here 52 years and being  
12 a woodsy person who's camped in the woods, hiked  
13 in the woods, down all the creeks and all, I've  
14 seen panthers before back then. I've seen  
15 panthers now. There's a regular panther that  
16 patrols on the Withlacoochee Gulf Preserve out  
17 there when Dr. O'Wiley was the owner of it. You  
18 see it and you can't tell me that if the boys are  
19 around that there's no girl. They've got to be  
20 out there or the boys wouldn't stay there.

21 I'm speaking from my heart and from history,  
22 having been here that long, I've been involved in  
23 environmental issues for 45 years now and I love  
24 this area. I do a lot of photography, I write for  
25 the paper. I have photographed numerous times

1 what has happened with the drought, with all of  
2 the creeks that used to flow, the springs that  
3 used to flow under Buckhead Road, they're all dry.

4 And last year about every six months and about  
5 four weeks ago I jumped down into every creek,  
6 every culvert that flowed under Buckhead Road and  
7 made pictures through the culverts, there's not  
8 any water to even be in there. It's just the  
9 amount of water that not only from the use of the  
10 water for the mines, but the evaporation process  
11 from the lakes.

12 You're taking water two different ways, not  
13 just from their water usage, but evaporation of  
14 those waters. And when you're talking about now  
15 putting an application for a sand mine right  
16 across the highway from there, that's going to use  
17 water. Then you go over further and you put a  
18 power plant in there, that's more water. So  
19 you're talking about, you know, turning the Nature  
20 Coast into the Cove Coast. We're going to have no  
21 water.

22 And there's been wells already -- I'm a person  
23 who has been in the postal service here forever,  
24 so people call me with all kinds of complaints.  
25 I've been up and talked to people whose private

1 wells have already gone dry. Some of the camps  
2 out on the Gulf say the springs don't flow out  
3 there anymore. The saltwater intrusion used to be  
4 at the bottom of Baldwin Lodge. Now it's beyond  
5 the Highway 19 bridge. So we have water problems  
6 we're going to have to face otherwise rather than  
7 having all of our water pumped out.

8 And I live super, super close and my office is  
9 right by Highway 19 and the thought of a thousand  
10 diesel trucks, if you've watched one what comes  
11 out of their exhaust and that stuff is a cancer  
12 causer. And they're going to get stopped at the  
13 traffic light because it just works that way.  
14 We're going to have a city that has no water,  
15 exhaust everywhere, and I just really -- I think  
16 you all really need to take into consideration  
17 above all the water of our area, the health of the  
18 people. And thank you very much.

19 (Applause.)

20 MR. HOLIAN: Thank you. Our next speaker is  
21 Janice Howie.

22 COMMENTER HOWIE: My name is Janice Howie. My  
23 husband and I are residents of Pasco County and I  
24 think it was Betty that was talking about the  
25 economic dollars that tourism -- excuse me --

1 tourism brings in and we are a couple of those  
2 tourists.

3 We come up here and kayak and actually we're  
4 even considering buying land in this area.  
5 However, we expect it to look like it does now.  
6 We're not going to buy land if the beautiful  
7 wetlands and everything else are destroyed.

8 I have frequently walked in the Weeki Wachee  
9 Preserve which as you probably know is an old  
10 mining area with pit lakes and it's hideous. I  
11 mean, everything is dead. It looks like -- except  
12 for the water, it looks like you could be walking  
13 on the moon.

14 The mine may bring some economic benefits  
15 short-term to this area, but once it's gone,  
16 whether that's in 30 years or a hundred years,  
17 you've got this ugly, dead area. And if you take  
18 care of your environment, your tourist dollars and  
19 ecotourism income is going to remain forever.

20 And so, therefore, you know, I would prefer  
21 that you not issue this permit, Alternative 1.  
22 However, you know, if it is necessary, number  
23 seven looks like the best choice possible. Thank  
24 you.

25 (Applause.)

1 MR. HOLIAN: Our next speaker is David Leach.

2 COMMENTER LEACH: My name is David Leach,  
3 L-E-A-C-H. I promised my wife before I left the  
4 house today that I wasn't going to slam the Corps  
5 on some of their previous decisions and I'm -- if  
6 I break that promise, please try to hold me to it.

7 If this issue was to be cited on the merits of  
8 the mining operation, it would be an open and shut  
9 case. There are virtually no merits to this  
10 operation at all. It offers a few jobs to a  
11 handful of green card workers at the expense of  
12 thousands of jobs in a nine county area. It risks  
13 the water supply and safety and quality of water  
14 to every person in the nine -- in the nine county  
15 -- at least the nine county area.

16 It has been noted on previous testimony in  
17 front of the county commissioners that going  
18 through with this project would expose the county  
19 and others to \$95 billion worth of liability  
20 because of the effect and the amount of water and  
21 the quality of water.

22 Putting a truck on the road every 45 seconds  
23 would change the character of the Nature Coast  
24 into the industrial mining coast. Any tourist  
25 with any ounce of sense will stay clear.

1           It should be noted that on two separate  
2 occasions the citizens of Levy County stood before  
3 the county commissioners against this project  
4 until 2 o'clock in the morning.

5           Between a mountain of limestone, a room full  
6 of gold, and a barrel of water, only one of these  
7 is necessary to sustain life. Expert testimony  
8 has also been entered into the record that a  
9 predictable storm surge within 13 years will  
10 breach the proposed berms. Whether your interest  
11 is agricultural, residential, or just water, this  
12 could affect everyone. Salt intrusion will affect  
13 all of these interests.

14           It should also be noted in the record that  
15 Vulcan, part of Titan, back in the 1980s created a  
16 discharge from one of their mining operations in  
17 South America that blanketed The Keys with silt  
18 and destroyed the reef.

19           Right now Florida is in the middle of an epic  
20 drought and the Suwannee River Management is  
21 issuing million gallon a day permits to everyone  
22 that requests them. It makes no sense to blow up  
23 the aquifer three times a week for the next  
24 115 years as you're proposing.

25           You know my address, but I'm not sure I know

1 the person who is going to make this decision  
2 where they live. Are they hiding behind some type  
3 of bureaucratic labyrinth in Washington D.C.?

4 The planet is really not in good shape. We've  
5 already lost half of our wetlands, half of our  
6 grasslands, and half of our forests. There are  
7 five areas of plastic the size of Texas that are  
8 occupying our oceans. There are dead zones in our  
9 ocean that are growing every day. If we make a  
10 decision on this project we should err on the side  
11 of caution and conservation. Thank you.

12 (Applause.)

13 MR. HOLIAN: That was everybody that had  
14 signed up as they came through the door to speak.  
15 I know we need to come back to Betty, but after we  
16 give everyone an opportunity who did not speak.  
17 If you're sitting there and you've decided you  
18 want to come up and say a few words, you don't  
19 have to use three minutes, you can use 20 seconds  
20 if you'd like.

21 Just raise your hand and I will call on you,  
22 that's fine. And then once we are done with the  
23 people who haven't spoken, we'll come back to  
24 Betty and anybody else who has any further words,  
25 so come on up. And remember since she doesn't

1 have your name, say your name clearly to her and  
2 spell it.

3 COMMENTER BOTTS: My name's Charles Botts,  
4 B-O-T-T-S, resident of Inglis. I just have some  
5 questions that I hope the Corps would consider. I  
6 wonder if they have considered it. Question No.  
7 1, in your initial presentation you pointed out  
8 the fact that this mine project is in the middle  
9 of a bunch of state conservation areas.

10 I was wondering if the Army Corps was aware of  
11 the fact that the present state government is  
12 going through a laundry list of determining a lot  
13 of the state conservation lands as surplus and  
14 making an active effort to get rid of them. So  
15 there's no guarantee that these conservation lands  
16 are going to be there to add as a buffer to the  
17 wetlands. So they're going to be displaced.

18 My second question is why are Alternatives 2  
19 and 5 not being completely discarded seeing as how  
20 they are being -- are unable to be mitigated by  
21 the project designs? It would seem to me if their  
22 impacts cannot be mitigated, these alternatives  
23 should not be considered.

24 Why -- my other question is why has the Army  
25 Corps decided on the hundred years? Having been

1 in state government, local state government  
2 myself, I was also under the impression  
3 conditional use permits were of a transitory and  
4 brief period. You know, a hundred years seems  
5 like it's permanent.

6 Considering the fact that we -- you know,  
7 other people have pointed out, you know, we're  
8 seeing the effects of sea level rise, sinkholes  
9 because of the drought period. Your study, when  
10 you did the aquifer studies it was like 2004 to  
11 2008, I think we're in the -- we were in a  
12 six-year drought period during that time. I  
13 wonder if the Army Corps was aware of that?

14 And then my fourth question is because of the  
15 closeness to certain public infrastructure such as  
16 the town of Yankeetown's public water system, why  
17 has there not been the consideration of  
18 performance bonds to be required should over the  
19 course of the life of this permit, that the owner  
20 and operator, you know, have that money available  
21 already locked in to be able to mitigate the  
22 impacts on private citizens and public  
23 infrastructure?

24 And then my fifth and last question concerns  
25 with the wildlife, something that I was involved

1 in in Pinellas County with the endangered species.  
2 The Wood Storks used to be, I'm not sure if they  
3 still are or not, were considered as equally  
4 protected as eagles. And, you know, there's a  
5 600-foot no activity area and I was wondering if  
6 there had been a study done to determine if  
7 there's a Wood Stork rotary adjacent to this mine  
8 site, how that would impact the developable area?

9 And that's the -- all five of my questions for  
10 the Corps that I would ask that they consider when  
11 they endeavor to make their decision. Thank you  
12 very much.

13 (Applause.)

14 MR. HOLIAN: Gentleman in the back. Okay.  
15 Then I'll come back to you.

16 COMMENTER RUPPERT: My name is Ruth Ruppert,  
17 R-U-P-P-E-R-T, and I live just outside the city  
18 limits of Inglis and a lot of the folks that are  
19 in this town know me because I work at the post  
20 office and I hear things every day.

21 I am very much against this project primarily  
22 because of the lack of guarantees that are given  
23 to the folks that are impacted on this. I haven't  
24 seen or heard any kind of guarantees from Tarmac  
25 or any of their affiliates that we can guarantee

1 there to be no saltwater intrusion in our wells or  
2 a guarantee that your well will not go dry or that  
3 the excavation of the lime rock and the water will  
4 not cause sinkholes of not only the nearby  
5 properties, but properties in any ten mile area  
6 because who knows how far those go.

7 And I don't -- I didn't see any kind of a  
8 guarantee about the impact on the coastal or  
9 marine environments which support such a rich  
10 variety of wildlife and habitat. And as several  
11 folks have spoken, which, boy, I'm glad that I  
12 deferred because they had some good stuff to say.

13 Like Jack Schofield said, Hey, you know,  
14 what's the reason for this? Well, there is a less  
15 costly alternative if aggregate is imported.  
16 Besides that, there's like 46 other mines within a  
17 100-mile radius of here. And then about the storm  
18 berms being not in accordance with the Levy County  
19 height. And, of course, Betty, I know she's going  
20 to hammer on that water quality so you better hang  
21 on tight.

22 And when you talked about the wildlife like,  
23 you know, female panthers don't exist? Wow,  
24 that's really out there. And gopher turtles  
25 weren't even mentioned? Come on now. You know,

1 they're everywhere. So some people were paying  
2 attention.

3 And the traffic impact will be minimal? Come  
4 on, this is little Inglis. You know, a thousand  
5 trucks, huh-huh. And Ms. Cannon said a hundred  
6 years, I'm right with her on that one. I think if  
7 we absolutely totally have to have this mine,  
8 which, you know, 30 years, that should be the most  
9 of it. And Ms. Howie came all the way from Pasco  
10 County to tell us how important our ecotourism is.

11 And if nothing else, okay, you don't need your  
12 water. Well, okay, apparently you missed Survivor  
13 when they didn't bring all their water. But,  
14 anyway, ecotourism is a big, big deal now because  
15 so many people have made this mistake of, Okay,  
16 we've got money in our pocket now, but now what's  
17 happened? And look at China. They have all the  
18 money, but they can't breathe their air.

19 And David Leach said the handful of jobs that  
20 risks the water and safety. And isn't that why  
21 we're having this is to see what the human impact  
22 is on the safety and environment? And I'm hoping  
23 you guys make the right decision. And, Charlie,  
24 those were all great questions and I'm hoping that  
25 at least somebody gives us some good answers

1 because at this point we're not getting any.

2 And, you know, it's not your yard, it's not in  
3 your backyard, so, hey, it's okay. But it's in  
4 our backyard and that's why we live here because  
5 of this economic -- I mean, because of this  
6 environment. That's why we're here. Anyway,  
7 thank you.

8 (Applause.)

9 COMMENTER FELDHUSEN: Gentlemen, Mr. Sarfert,  
10 Mr. Collazo, and I'm sorry, I forgot the other  
11 one, the moderator. Thank you. I've read your  
12 draft environmental impact statement and I got to  
13 say I'm truly --

14 UNIDENTIFIED SPEAKER: Who are you, Larry?

15 COMMENTER FELDHUSEN: I know who I am. Do you  
16 know who I am?

17 UNIDENTIFIED SPEAKER: She doesn't.

18 COMMENTER FELDHUSEN: I'm sorry, Larry  
19 Feldhusen. That's F, as in Frank,  
20 E-L-D-H-U-S-E-N. I'm appearing here on my behalf  
21 as a Yankeetown citizen this evening. Sorry about  
22 that.

23 I'm truly awed by the amount of detail you  
24 gentlemen have gone into. Many hundreds of pages  
25 and I even stayed awake through most of them when

1 I was reading them. When I went through it, I  
2 kept coming back to the central premise that the  
3 environmental impact statement is based on.

4 The project purpose, if you will, or premise  
5 that the applicant based this application on is  
6 that there is a demand or a need for affordable  
7 aggregate in this market area. Now, the term  
8 affordable is key there because they never  
9 demonstrated anywhere that there's a critical need  
10 for this aggregate here.

11 If there was a critical need, the bonds of  
12 supply and demand and economics and substitution  
13 is going to make the aggregate available one way  
14 or another. We saw in the last decade a time when  
15 most commodities soared in price, things like  
16 concrete, lumbar, and yet we kept building stuff  
17 as fast as we could at whatever price, no matter  
18 where we had to get that stuff from. And then  
19 Kabamm, it all stopped.

20 And that brings up the next question is the  
21 projections do show some increase in population  
22 and presumably an increased need for some  
23 aggregate, but I think the science that those  
24 projections are based on is very questionable  
25 because what we're still seeing in our local

1 communities here is losses in people. It may be  
2 bottoming out, but we have not seen the turn yet.  
3 Their projections go out to 2020. That's what,  
4 eight years away and this mine is going to go on  
5 for another hundred years past that. So I think  
6 the projections are very questionable.

7 If we really had a need, the applicant -- I  
8 think the need is for the applicant to be able to  
9 mine this stuff and deliver it 70 miles and be  
10 competitive with the other suppliers. That's as  
11 far as I could get from the environmental impact  
12 statement.

13 Seventy miles seems to be a key here. I  
14 don't know what cost that puts the aggregate at at  
15 the outer circumference of the 70-mile ark, but  
16 presumably if they go past that then they're  
17 running into supply at a lesser cost outside of  
18 that.

19 We've got 70 miles being the key here and yet  
20 other markets in Florida are being served from  
21 much farther away than 70 miles. Some of their  
22 supply is coming from Newfoundland, some of it's  
23 coming from Mexico, some is coming from the  
24 Bahamas. Jacksonville actually gets some of  
25 theirs from the lake fill which is presumably

1           hauled on trucks, but it's much farther than 70  
2           miles away.

3           We are dealing with a fairly low value  
4           commodity here. Most of the cost is in the  
5           transporting it. We don't know what the  
6           transportation situation's going to be over the  
7           next hundred years. We've heard mention of a port  
8           right here in Citrus County. It's right close to  
9           Red Level which is the center of the market area  
10          that's mentioned by the applicant in here that  
11          they want to be able to serve. So I don't really  
12          see a critical need. Critical need is for  
13          commodities like fresh water, fresh air. It's not  
14          for aggregate.

15          The environmental impact statement  
16          acknowledges the fact that there are costs,  
17          external costs if you would, to people other than  
18          the applicant in providing this. And that, of  
19          course, is the mission before the Corps is to  
20          weigh those costs in this thing.

21          MR. HOLIAN: Larry, can you wrap it up?

22          COMMENTER FELDHUSEN: Yeah, you want me to  
23          wrap it up?

24          MR. HOLIAN: To be fair to everybody else.

25          COMMENTER FELDHUSEN: All right. The point is

1 I don't understand why we're even looking at this  
2 when we're talking about a lower value aggregate.  
3 Critical need has not been established, but we  
4 have established that there are impacts to  
5 critical resources and I would propose that the  
6 only appropriate scenario or alternative is number  
7 one. Thank you very much.

8 (Applause.)

9 MR. HOLIAN: Okay. The purple shirt back  
10 there was first up.

11 COMMENTER DAME: Doug Dame, Yankeetown. I did  
12 sign up, but I'm not offended that I wasn't on  
13 your list. I have a couple things that are really  
14 more questions than comments, but I'm kind of  
15 hoping that some of the three minutes might go for  
16 an answer. And I have not read the entire draft  
17 EIS, so if the answer is well covered there, then  
18 an answer saying read the darn thing would be  
19 perfect. If it's not there, I'm curious.

20 The first has to do with Reddick. A lot of  
21 the financial projections for alternatives to  
22 mining here seem to pick Reddick as the center of  
23 the service area, but when Tarmac America puts  
24 their transportation plan to the county, by my  
25 recollection 60 or 70 percent of the traffic was

1 going through Citrus County where it was going  
2 southeast to the Orlando area to the very end of  
3 their economic range of 60 or 70 miles.

4 So based on those projections, it's  
5 inconceivable to me that Reddick is the center of  
6 the distribution area and then using that as kind  
7 of the financial point where all these  
8 calculations come in is crazy. It just doesn't  
9 work. So I'd like to know why that is.

10 The second question was when SAIC, did the  
11 groundwater modeling, I was wondering if they had  
12 taken more measurements on the groundwater flow or  
13 whether it was all based on the original set of  
14 test wells and things like that that were done?

15 Third point I was wondering is you mentioned  
16 that two of the alternates, I think it was  
17 Alternative 2 and I think Alternative 5 have  
18 negative UMAAM scores and I was wondering if it's  
19 possible for the Corps to give a permit if there's  
20 a negative UMAAM score or does that require either  
21 a denial of that option or more mitigation?

22 And then the fourth point was in this  
23 executive summary that you distributed this  
24 evening, on Page 20 there seems to be an  
25 inconsistency about mitigation and S 91 in number

1 one there it says that the goal is to recreate the  
2 landscaping mosaic as it occurs in 1963 mosaic  
3 photographs and that recognizes there was already  
4 timbering going on, where in a few paragraphs  
5 later on it says that the goal is to restore the  
6 historic Gulf Hammock community types. That's a  
7 very different and more ambitious goal. So I'm  
8 wondering what is the realty of what the  
9 mitigation expectation is there. Thank you very  
10 much.

11 (Applause.)

12 MR. HOLIAN: Front row here. Doug, how'd you  
13 spell your last name?

14 COMMENTER DAME: D-A-M-E.

15 MR. HOLIAN: Okay. Thank you.

16 COMMENTER RIMBY: My name is Brad Rimby. I'm  
17 from Chassahowitzka. Last name Rimby, R-I-M-B-Y.  
18 I'm a registered professional engineer in the  
19 state and for the last year and a half I have  
20 spent a majority of my free time arguing with our  
21 water management district about their plans to  
22 reduce our flow in the river by 11 percent. So as  
23 a result of that, I've become fairly familiar and  
24 fairly skeptical of groundwater models.

25 If I'm doing the math correctly, on this

1 particular project from what you just told us that  
2 it's going to be 120 feet deep in the deepest pit,  
3 that would put it over 100 feet below sea level.  
4 Is that your understanding of it? I didn't see  
5 anything about 12 feet above sea level on the  
6 surface. So I guess I would be very skeptical of  
7 any groundwater model that says that there's not  
8 going to be damage as a result of mining a  
9 hundred feet below sea level.

10 When I -- I used to -- one of my favorite  
11 sayings in the past was there's three kinds of  
12 liars in the world. There's liars, damn liars,  
13 and statisticians. As a result of my dealings  
14 with SWIFTMUD, I've modified that there's three  
15 kinds of liars in the world: Liars, damn liars,  
16 and computer modelers.

17 I would be very cautious about the accuracy of  
18 your model. We've talked to PHD modelers who are  
19 very unimpressed with the kind of modeling that  
20 SWIFTMUD's doing and all I can say is there's far  
21 more that's unknown about our karstography (sic)  
22 than what is know and if anybody tells you  
23 different is lying to your face. Thank you.

24 (Applause.)

25 MR. HOLIAN: Far back. I'm getting back to

1 the people who have already spoke at the end after  
2 we've given everyone a chance that hasn't.

3 COMMENTER SCHODDE: My name is Reverend Jeanne  
4 Schodde, S-C-H-O-D-D-E. I'd like to speak on  
5 behalf of my husband, Reverend Ian Schodde, as  
6 well if I may because we're one and we agree. I  
7 think it was last month, but I can't be sure, I  
8 read an article in *National Geographic*. They did  
9 a world study on water and *National Geographic* is  
10 saying we're third worst in the world, this  
11 county. That's pretty pitiful.

12 What I would like to say from a different  
13 perspective, however, is that we need to pray.  
14 People don't want to listen to us and we live  
15 here. I live on 21 Cherry Lane right around the  
16 block right here in Inglis, and as much as I'd  
17 like to be heard, I don't always feel that I am.

18 But I do have a higher power. I do have a  
19 bigger boss than all of these people who sit  
20 behind a computer and I would ask all of you to  
21 pray if you really care about this town. We have  
22 another way out, we can pray. Please. Thank you.

23 (Applause.)

24 COMMENTER HARRELSON: Hi. Sorry about the  
25 computer. I try writing, but then I can't read

1 it. My name is Cathy Harrelson and I'm the  
2 Florida organizer for Gulf Restoration Network  
3 which is based in New Orleans, but I live in Saint  
4 Petersburg and have lived there for about  
5 35 years.

6 Even having lived there 35 years, though, I  
7 got there after we had already pumped our fresh  
8 groundwater out from under us and have lived with  
9 saltwater intrusion ever since and have pretty  
10 much looked to counties farther north shall I say  
11 for our own freshwater. So saltwater intrusion is  
12 a very big deal and this project certainly appears  
13 to have a problem with that.

14 I just had a couple kind of questions really.  
15 And Brad's comments about -- everybody's comments  
16 were amazing, but comments about the karst. We  
17 had talked earlier about the rainfall measure that  
18 you looked at and you said it was five-year sort  
19 of lean measurement over a period of years and  
20 when -- I just want to point out that the last  
21 20 years have been the lowest rainfall levels in  
22 the last 120 years. That's 20 years. Not  
23 exactly, you know, your run of the mill drought.  
24 That looks a lot like a rainfall pattern.

25 So, you know, we certainly have to talk about

1 climate change and we certainly have to look at  
2 the fact that our rainfall has decreased and very  
3 likely will continue to be lower than it used to  
4 be. So I think that your modeling is wrong for  
5 that reason.

6 Also, the other thing regarding the water  
7 seepage, you said a .3-foot average drawdown. Is  
8 that correct? I missed the very beginning because  
9 I had the flat tire. And by the way, thank you  
10 very much for helping me with that. It would have  
11 been a mess.

12 But what concerns me about that again is using  
13 an average really doesn't tell the story of what  
14 are the worse case drawdown scenarios. Because  
15 that's really what's important here, once you draw  
16 down to a level that allows, you know, freshwater  
17 flows to back up enough that saltwater can come  
18 in, you know, there's really not much fixing that.  
19 So that I have a big concern with using averages.  
20 It's just -- it just does not tell us what the  
21 real ground situation is.

22 And the other thing was about the panthers.  
23 You know, you said that it's a corridor for male  
24 panthers and I'm saying to myself, Well, if  
25 they're trying to get to females, it sounds like

1 their corridors are pretty important. You know,  
2 it's not something we can say whether there's  
3 females or not, this corridor is extremely  
4 important. And there are efforts to introduce  
5 panthers in other parts of the state other than  
6 below the Caloosahatchee. So I think you really  
7 need to look at that.

8 And I just wanted to let -- oh, and I have one  
9 more question about the level of service on the  
10 roads now. You said -- you made some comments  
11 about the number of vehicles. I just wonder what  
12 is the LOS for US 19 now in this area that's going  
13 to be affected? Do we know that? I mean, that's  
14 just a question I have for you. GRN will be  
15 submitting written comments prior to the end of  
16 the comment period, so thank you very much.

17 (Applause.)

18 MR. HOLIAN: Okay. I gave her an extra  
19 30 seconds for the flat tire.

20 (Laughing.)

21 MR. HOLIAN: Okay. Right here in the middle.

22 COMMENTER STONE: John Stone, Inglis, Florida.

23 MR. HOLIAN: Can you spell your last name,  
24 please?

25 COMMENTER STONE: Stone, S-T-O-N-E.

1 MR. HOLIAN: Got it.

2 COMMENTER STONE: Like a rock. Anyway,  
3 everybody here has -- everything they brought up  
4 is all the stuff running through my mind and  
5 they're all legitimate things, but I think people  
6 just don't honestly know whether it's animals, the  
7 wildlife, the water, anything. These are major  
8 concerns for this area. I think everybody brought  
9 up good points.

10 I think the mine would be nothing but  
11 disruptive in the long run. And I'll be very  
12 honest with you, I don't like seeing, a boring  
13 company comes in, they invest their money, they  
14 could care less about what we got over here. You  
15 know, the money's going someplace. It ain't  
16 coming here. And for the few employees they're  
17 getting out of it, it's just not cost-effective.  
18 It's not going to help this area.

19 Every disruptive comment that came up tonight  
20 is a legitimate comment and I hope like heck they  
21 don't get the mining here. Thank you.

22 (Applause.)

23 MR. HOLIAN: Okay. Behind you actually.

24 COMMENTER OFFERLE: Good evening. My name is  
25 Mandy Offerle, O-F-F-E-R-L-E, and I'm from Levy

1 County. I live in Cedar Key. And I just have two  
2 comments to make and one is to reenforce the whole  
3 water discussion here tonight. It is ludicrous to  
4 me how we could be sitting here considering  
5 anything that would affect water usage in this  
6 area. It is just ludicrous. There's so much  
7 literature about talking about the fact that there  
8 is no water and there will be less water.

9 The two wonderful books of labor by Cynthia  
10 Barnett should be required reading for everybody  
11 if you haven't already read them. One of them is  
12 the *Blue Revolution*. The other one's *Mirage*.  
13 There is no water. So this whole thing is crazy  
14 that we're even considering it.

15 The second thing is that the need is not well  
16 established. Somebody mentioned that earlier and  
17 as I go back and I read your thing and it says  
18 here -- the argument seems so specious. It says a  
19 limestone aggregate including aggregate that meets  
20 the Florida DOT specification for building  
21 infrastructure to satisfy long-term public need.  
22 And if that doesn't raise a question. It does.

23 And then you come down where you talk about,  
24 The Congress has noted the mining of such  
25 aggregate is essential for national security,

1 wellbeing, and industrial production. That is  
2 just so broad and it sound specious. So I would  
3 readdress that. I would think about readdressing  
4 that. Thank you.

5 (Applause.)

6 COMMENTER WARD: Good evening. My name is  
7 Fred Ward, W-A-R-D. I'm actually the mayor of  
8 Dunnellon, Florida. I am not over here  
9 representing the Council of Dunnellon. I'm over  
10 here as a private citizen just trying to gather  
11 information.

12 I'm very, very impressed with the study and  
13 I'm very, very impressed with the comments.  
14 Actually, quite studious comments of the audience.  
15 I thought a lot of them were very thoughtful. We  
16 in Dunnellon have always been -- I was raised in  
17 Ocala. We always considered Dunnellon the  
18 red-headed stepchild and Dunnellon wasn't very  
19 relevant. And I guess maybe the people in Inglis  
20 thought they were the red-headed stepchildren as  
21 well, but if we could have a neutral co-misery  
22 here.

23 But I -- I live on the Rainbow River, I  
24 actually live on the canal, and I have my  
25 neighbors' boats that have been sitting on dry

1 land because the water is down this summer by  
2 about 18 inches. I mean it's unbelievable. I  
3 lived 45 years in Southern California, when they  
4 put the aqua duct from Owens Valley down to LA and  
5 went to Owens Lake which was 12 miles north to  
6 south and eight miles east to west, I don't recall  
7 the depth, but the city Of LA drained that lake  
8 dry in a decade.

9 I think the most critical issue because I'm  
10 all for economic development and I'm all for jobs  
11 and I don't think politicians did their job  
12 20 years ago, all they built was roof tops. They  
13 didn't take care of industry and didn't take care  
14 of commerce.

15 But to me, water is really the crux of this  
16 whole thing. I mean, it's the bottom line. I  
17 don't -- you can talk about everything else  
18 depends on the water. I don't care if you talk  
19 about the animals. If the water is not here, the  
20 animals are not here. So the water is the bottom  
21 line, the most common denominator.

22 I actually didn't come over here with a bias  
23 and I was pretty ambivalent about which way I felt  
24 about this and I came over to get personal  
25 knowledge. Another council person, Ms. Penny

1 Fleegeer, is back here that joined me so we could  
2 go back to our council and maybe talk  
3 intelligently about this, but I guess I'm late to  
4 the intelligence party here because we're at this  
5 final stage of the final draft. Our city manager  
6 and our counselor are going to respond in writing,  
7 okay, before your deadline on this issue.

8 But I would like to commend the work you've  
9 done and I would like to commend the audience for  
10 being civil tonight. Sometimes these meetings  
11 don't turn out that way and they're to be credited  
12 for that and they're to be credited for their  
13 thoughtful thoughts and their comments and there  
14 were some really seriously good questions.

15 But my mind, my personal bias, is that it all  
16 comes right back down to the water. Nothing else  
17 matters. I mean, if you don't have water, there  
18 isn't commerce here. If you don't have water,  
19 there aren't animals here. If you don't have  
20 water, there's no people here.

21 So I was very surprised in my ignorance to  
22 realize that this was like underwater mining. I  
23 mean, this blows my mind away. I never even  
24 contemplated that. I guess I'm showing my  
25 ignorance, but I'm here to get educated tonight.

1 That's the purpose I came and I'm really -- I  
2 really need to know more about that before I can  
3 support this project.

4 I mean, I know you guys have worked hard,  
5 you've done due diligence, you're here to find out  
6 what people think, and I commend you for that and  
7 I hope you take some of these thoughts very  
8 serious. Thank you very much.

9 (Applause.)

10 MR. HOLIAN: Anybody left in the audience that  
11 has not spoke yet that would like to say something  
12 before I turn it back over to the people who  
13 already have spoken? I have one more person in  
14 the back. Anybody else? Okay.

15 COMMENTER PERAMBO: Hi, my name is Dixie  
16 Perambo (phonetic) and I live here in Inglis. I  
17 agree with what everyone has stated tonight. I  
18 can't really add to the questions because I think  
19 each person that came up here presented some very  
20 good questions and I'm interested to see those  
21 answers.

22 But something that I haven't seen addressed  
23 and that I'm going to give you like a little  
24 personal story, I have four children and two of my  
25 children and a couple of their friends, they go to

1 school over in Ocala. They decided to go hang out  
2 one day after school at the quarry where there  
3 was -- there had been mining done.

4 So they took advantage of an opening and went  
5 through and they were swimming in this open area,  
6 in this old mining area. So they had a really  
7 grand time, couldn't understand why more people  
8 weren't there. And as they went back to their  
9 vehicle, they saw the police officer who was there  
10 to explain to them why they shouldn't be there.

11 The reason being, it's not just the fact they  
12 were trespassing, that's a given, but the officer  
13 explained to them that there's some kind of amoeba  
14 in the water that can cause some serious problems,  
15 some serious health issues, and that is why they  
16 regularly patrolled it. They weren't as much  
17 about the trespassing issue just for kids hanging  
18 out there, but it's what actually develops in  
19 those still areas, those waters, that sit there  
20 over time.

21 And in the middle of Marion County there's all  
22 kinds of, you know, those empty mining areas that  
23 have been abandoned and nothing is done with them.  
24 They just sit there. Well, we have children  
25 around here that for lack of better things to do

1 and in the next hundred years I'm sure there's  
2 going to be other children and who's going to be  
3 watching that and how is that going to be kept  
4 safe? How is our area going to be kept safe?

5 I agree a hundred percent with the water  
6 issues all the way across the board, but those --  
7 those areas will fill up with water. Those -- you  
8 know, there will be that stagnant water sitting  
9 there and that will be an issue as time rolls on,  
10 whether it being ten years from now or the  
11 100 years from now or 200 years or 500 years or  
12 whatever. Thank you.

13 (Applause.)

14 COMMENTER BERGER: Well, Mr. Sarfert didn't  
15 sit behind his desk and appraise these wetlands.  
16 He walked it, he knows they're there, and so I  
17 really --

18 MR. HOLIAN: Say your name.

19 COMMENTER BERGER: What?

20 MR. HOLIAN: Say your name again so she gets  
21 it in the record.

22 COMMENTER BERGER: Oh, I'm Betty Berger and  
23 you're going to get this afterwards.

24 But you don't know this drought will be over  
25 next year. The reason Florida Power gave

1 3,000 acres to the state was because there was  
2 30 years of no rain. They couldn't run their  
3 hydroelectric plant at the main dam. They  
4 couldn't function. They had to keep running the  
5 Inglis plant to try to keep water in the river  
6 just to keep it from drying up. So water is very  
7 important. You don't know when this drought will  
8 end.

9 You can't just give these people this -- this  
10 right to take away from the citizens. I'm  
11 proposing Alternative 7. I think that was great  
12 for you to come out with these alternatives  
13 because you haven't made up your mind which one  
14 you would go with.

15 Tarmac is against the Levy County comp plan.  
16 Some observations from Shenley Neely who was a  
17 planning director written to Rob Corbitt, the  
18 development director, and he sounded like he's in  
19 their pocket. He agrees with everything they  
20 said. It don't matter whether it's against the  
21 comp plan or not.

22 (Applause.)

23 COMMENTER BERGER: This is in what she wrote,  
24 Coastal Management Element, Policy 1.1: The Levy  
25 coastal zone encompasses areas within the coastal

1 high hazard area. The county shall discourage  
2 incompatible future growth in the coastal zone and  
3 limit development of environmentally sensitive  
4 lands including, but not limited to, coastal  
5 marshes, wetlands, mangroves, and marine grass  
6 beds as set forth in conservation, future land  
7 use, and capital improvements elements of the  
8 plan.

9 Policy 1.3: Coastal marshes and wetlands  
10 disturbed by development shall be restored to an  
11 area and condition equal to or greater than the  
12 original state.

13 Policy 1.7: Endangered and/or pristine  
14 coastal marsh habitats shall be preserved in a  
15 natural state. They didn't say try. They said,  
16 Yeah, that's what you better do.

17 Policy 5.3: Prohibit activities that are  
18 known to cause saltwater intrusion into the Levy  
19 County freshwater aquifer. Note: Digging as  
20 deeply as Tarmac plans to go, they will hit highly  
21 mineralized water and then saltwater below the  
22 freshwater lens.

23 Water in Gulf Hammock wells turned red with  
24 minerals on Tarmac's first dig causing Hugh Futch  
25 to abandon his house and move. He lives in

1 Alabama because of that first dig. They hit the  
2 mineralized water. There's saltwater under that.  
3 You can't drink that stuff.

4 And Plum Creek in their opening up 70 percent  
5 of Levy County to mines, they have poisoned all  
6 the oak trees. There's not the first acorn. They  
7 have poisoned the deer's food supplies that they  
8 live on. The deer are roaming around over the  
9 highways looking for food and water because Plum  
10 Creek cares nothing about the environment, animals  
11 or anybody else.

12 Environmentally sensitive lands, including but  
13 not limited to, coastal resources -- this is  
14 Shenley Neely -- as designated areas of critical  
15 state concern will be protected from mining  
16 operations. That's what the Levy County comp plan  
17 says. I don't know if you listened to the comp  
18 plan, but I think you guys are very open minded  
19 and you're going to take what's said here tonight.  
20 It's why you took your time to come and I  
21 appreciate it for one thing.

22 (Applause.)

23 MR. HOLIAN: Noel?

24 COMMENTER DESMOND: Thank you. Noel Desmond,  
25 D-E-S-M-O-N-D. First name, N-O-E-L. It just

1       dawned on me 20 years ago I related that I was  
2       involved in the Usher Dairy project in an area  
3       that was regulated by -- federally regulated  
4       wetlands and during that period of time I had some  
5       graduate students from the University of Florida  
6       come in and check the karst, the sinkholes  
7       surrounding the proposed dairy site, and I see  
8       here under Chapter 6, Page 61, the Biological  
9       Research Associates.

10       I do not see where they have taken into  
11       account species that might be below ground in that  
12       karstology. In Florida we have specific species,  
13       that some of them are located only in one  
14       sinkhole, one area and no where else, and a survey  
15       has not been done yet on those species, if those  
16       species are situated within that area.

17       The other thing is that during that  
18       involvement with the dairy I discovered as I  
19       related before six and a half miles of canals dug  
20       in federally regulated wetlands without permits.  
21       At that time the Corps of Army Engineers stated  
22       that it was the worse environmental damage they  
23       had seen. That totaled about four acres. I  
24       believe it was four or five acres of total damage  
25       if you combine them. Yet, we're speaking here of

1 an area being done of 2,900 acres, 120 feet deep,  
2 which I think far outweighs my four acres back  
3 then.

4 So I really would think that before any  
5 permits are even considered, that the  
6 environmental impact study needs to be gone over  
7 once again and those areas that I've just  
8 mentioned which is in the karstiology needs to be  
9 studied, but I would prefer that the Corps took on  
10 their number one option here. This whole thing  
11 has been a mess to be honest with you.

12 The other thing I'd like to relate to you in  
13 regards to the water, is on my piece of property  
14 which is just outside of Chiefland, I have a pond  
15 that's 25 feet deep. That pond is bone dry. Yet,  
16 three and a half -- three miles from my pond is a  
17 dairy that used to be termed the New York Dairy, I  
18 have no idea what it is termed now, they have  
19 seven -- I believe it's seven pitted irrigation  
20 pits, units, and I can go by there any time of any  
21 day and see anywhere from three, four or five of  
22 them going 24 hours a day cooling cattle, while  
23 we're -- while our water supply is going dry.

24 You can't -- the political situation we have  
25 in this county is by far not the best. I know for

1 a fact that during the campaign 2010, two of the  
2 candidates who were running for the county  
3 commission office were invited to Tarmac meetings  
4 by invitation only. During the campaign before  
5 the election, those people related that they were  
6 objecting in regards to the Tarmac permitting, a  
7 special exception. Once it came to them they  
8 voted for Tarmac. Boom, boom, no questions, no  
9 nothing. So our last recourse is with you people  
10 really and possibly with the courts.

11 But in any case, there are subjects here that  
12 I brought forth in regards to other species that I  
13 think you need to look into also or have looked  
14 into. And sorry to throw a monkey wrench into the  
15 works, but that's my job, too, as a citizen.  
16 Thank you very much.

17 (Applause.)

18 MR. HOLIAN: Did you want to leave anything  
19 with us? Noel?

20 COMMENTER DESMOND: Pardon?

21 MR. HOLIAN: Did you want to leave anything  
22 with us?

23 COMMENTER DESMOND: I have -- you'll have to  
24 excuse me, I mailed a disk along with all the  
25 documentation I had, but I can go ahead and -- I

1 didn't bring that other information that I just  
2 related to you. I have that at home. Actually,  
3 it was the citizens here that brought that to  
4 mind. I was having a senior moment there over  
5 20 years. So I can go ahead and send that  
6 information to you if you so wish.

7 MR. SARFERT: Thank you.

8 COMMENTER SCHOFIELD: Jack Schofield. I  
9 didn't spell it the first time. It's  
10 S-C-H-O-F-I-E-L-D. Just a couple comments that  
11 have to do with when you did your traffic  
12 presentation. If I'm not mistaken, and I may be,  
13 the Links & Associate who's represented by the  
14 applicant and those are the traffic studies that  
15 were done in here, I just think that the traffic  
16 study, if you look on Page 3-83, you're getting a  
17 traffic study report from traffic on county  
18 road -- from US 19 to County Road 40 into Marion  
19 County, there is a weight limitation on that road  
20 and why that would be included in the study would  
21 be beyond the others. Maybe they want to know  
22 that vehicles have another place to go.

23 I believe it's a ten-ton weight limit on that  
24 road and that is included in your report as I  
25 guess a feasible way to transport the aggregate.

1 As well as county road from US 19 North to 121 to  
2 County Road 336 to County Road 40 which then goes  
3 into Marion County. I understand there's people  
4 here from Dunnellon and I would be concerned about  
5 truck traffic going through their historic  
6 district. There's no way around it at this time.

7 And then finally, the impacts, water impact.  
8 The water impacts. Obviously, listening to  
9 everybody it's come to me that how does the Corps  
10 work in understanding what else is going on in the  
11 area in a 70-mile radius perhaps as to what  
12 permits are being issued by our water management  
13 districts and what cumulative effect that may  
14 have?

15 There's much talk, the citizens talk about it,  
16 somebody handed me a note about one of our  
17 county's parks being closed due to saltwater  
18 intrusion which I guess is probably 15 miles  
19 inland. I would suggest maybe you contact Levy  
20 County Board of County Commissioners to find out  
21 if, in fact, there is an issue in Blue Springs  
22 Park because that's quite a ways inland.

23 I live on the river here in Yankeetown. Just  
24 the first time in eight years, I irrigate from the  
25 river, I lost about 20 percent of my plants that

1 are not able to survive saltwater intrusion.  
2 There was a presentation made about the  
3 Withlacoochee Gulf Reserve about two months ago.  
4 A gentleman from Rainbow Springs State Park and  
5 the statement was made that the Rainbow Springs  
6 was down 30 percent which feeds into the  
7 Withlacoochee River.

8 So I think you need to look beyond the  
9 immediate area and truly understand what St. Johns  
10 Water Management District is doing, SWIFTMUD,  
11 Suwannee River Water Management District. There's  
12 an application out there for many, many million  
13 gallons a day being drawn from the aquifer in  
14 Ocala for a cattle ranch of about 30,000 acres.

15 There's also an individual that's bought  
16 15,000 acres in Levy County for the same purpose.  
17 Obviously there's going to be some withdrawals.  
18 I'm not 100 percent sure where that property is,  
19 but it's in Levy County and I would guess  
20 somewhere due east of the mine site. Thank you.

21 (Applause.)

22 MR. HOLIAN: Is there anybody else that would  
23 like to make a comment?

24 COMMENTER PRICE: Can I speak again?

25 MR. HOLIAN: You sure can.

1 COMMENTER PRICE: I love the saying -- Sally  
2 Price, very easy to spell. Price is usually  
3 right. Sorry, very bad joke. I did say I was  
4 pre-BC, before the barge canal. I love the saying  
5 if you always do what you always did, you always  
6 get what you always got.

7 Going to that, I'd like to say that the  
8 Withlacoochee, the water in the Withlacoochee was  
9 a beautiful pristine gorgeous waterway filled with  
10 life, beautiful flowing springs that bubbled up  
11 and I snorkeled it from the old hydro plant all  
12 the way down before it was cut. I'd like to say  
13 this is my story of the four ways that this  
14 happens.

15 You have a beautiful, crystal clear fast  
16 flowing river. It's cut in half, it's killed, and  
17 then it's named an outstanding Florida waterway.  
18 I haven't figured out that sequence yet, after  
19 it's killed why. But I would like to say that our  
20 water in the lower Withlacoochee is suffering from  
21 this drought that is affecting everywhere.

22 The Lake Rousseau, as a newspaper reporter, I  
23 go up and take pictures every other day of the  
24 drop in the water on Lake Rousseau and I have  
25 never seen that lake down ever in 50 years like it

1 is today. It's down over one foot, one foot  
2 three inches on the measures at the old hydro  
3 plant main spillway. And that is the only place  
4 that we get our water from in this river and it  
5 comes from upstream, the Rainbow River.

6 I went with Dan to the Gum Slew presentation  
7 because Gum Slew was drying up over there and this  
8 really scares me that all of this is happening.  
9 When you see that Fanning Springs on the Suwannee  
10 is having red water back up from the Suwannee, the  
11 tannic acid backed up into the spring that's  
12 always been the crystal clear swimming hole.

13 Heart Springs near Bronson's been shut down  
14 for swimming. The Blue Springs near -- excuse me,  
15 Blue Springs near Bronson, it's been their  
16 swimming hole for years, it's closed down  
17 completely because there's no water there. And  
18 this really scares me because it's not just the  
19 water.

20 The creeks that flow, the springs that flow  
21 from that hammock that have no water in them  
22 anymore as far down as Buckhead Road. There's  
23 none. That water goes into the Gulf and blends  
24 with the saltwater and you have to have that  
25 freshwater blend to maintain those marshes which

1 are the environment for all of the species of fish  
2 to come in and breathe and I just see this being a  
3 diaster.

4 And I'm not for any one of those provisions.  
5 I'm for, you know, save us, save our lives, save  
6 our health and deny this. I just really -- I  
7 cannot believe it. That we could do what we did  
8 to our lower river with the barge canal and now  
9 we're going to turn around and kill our wells.  
10 Thank you.

11 (Applause.)

12 MR. HOLIAN: I believe that was everybody?

13 COMMENTER BERGER: Could I just say it takes  
14 500 feet to stop a loaded rock truck. They can't  
15 stop for our red light.

16 MR. HOLIAN: You just did.

17 COMMENTER BERGER: Those trucks every few  
18 seconds, nobody can cross 19.

19 MR. HOLIAN: Did you get that?

20 COMMENTER BERGER: And I'm Betty.

21 MR. HOLIAN: You did?

22 COMMENTER PRICE: I'd like to thank y'all for  
23 being such attentive listeners. I can tell you  
24 were listening to every word. Thank you.

25 (Applause.)

1 MR. HOLIAN: That closes the official comment  
2 period of the public meeting and I would like to  
3 turn it over to Mr. Ed Sarfert again for closing  
4 remarks.

5 MR. SARFERT: Just to wrap up, one thing I  
6 meant to mention in my presentation there is in a  
7 short presentation it was going to be difficult to  
8 go over all the topics. There were a lot of  
9 things I didn't touch on or things that I just  
10 touched on very briefly. It's just impossible to  
11 do in a short session tonight and I didn't make  
12 that clear at the beginning of my presentation  
13 like I meant to.

14 But I'd also like to thank everybody for the  
15 comment and I appreciate the good, solid comments.  
16 Not just comments, We don't like this project,  
17 don't do the project, this is why we don't like  
18 the project. That helps out tremendously and I  
19 appreciate that.

20 That's really about it other than if you have  
21 questions during the comment -- during the comment  
22 period there is time for back and forth  
23 discussion, but afterwards I will be here for any  
24 additional questions you'd like answered tonight.  
25 So the ones that were posed or additional

1 questions, we can talk immediately after this.

2 Thank you.

3 (The proceedings were concluded at 9:09 p.m.)

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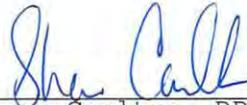
REPORTER'S CERTIFICATE WITH ACKNOWLEDGMENT

STATE OF FLORIDA  
COUNTY OF LEVY

I, Shannon Carlton, RPR, certify that I was authorized to and did stenographically report the foregoing proceedings; and that the transcript is a true and complete record of my stenographic notes.

I FURTHER CERTIFY that I am not a relative, employee, attorney, or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorneys for counsel connected with the action, nor am I financially interested in the action.

DATED this 16th day of June, 2012



Shannon Carlton, RPR  
Notary Public-State of Florida  
My Commission No. EE127661  
Expires: 09/18/2015

**I.21.6 Comments Received After Public Comment Period**



P.O. Box 174 • Athens, GA 30603-0174

November 6, 2012

Edward Sarfert, Project Manager  
U. S. Department of the Army Corps of Engineers (Corps)  
Regulatory Division  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502-5794  
edward.p.sarfert@usace.army.mil  
<http://www.kingroadeis.com/>

Re: Supplemental Comments on Draft Environmental Impact Statement (DEIS) of Proposed Tarmac American LLC's ("Tarmac" aka "King Road") permit to fill waters of the United States for activities associated with limestone mining in Levy County, Florida  
**Supplemental DEIS Required – Center for Biological Diversity's Limited Appearance Statement**  
Cumulative Impacts from Combined Licenses for Levy Nuclear Plant Units 1 and 2 ("LNP"), Docket Nos. 52-029 and NRC-2008-0558 - Project No. SAJ-208-00490 (IP-GAH)

Dear Mr. Sarfert:

On July 10, 2012, I sent you an extensive comment letter on the DEIS for the proposed Tarmac mine with more than a dozen attachments. That comment letter and exhibits described how and why the DEIS for the proposed Tarmac mine was deficient and justified a Supplemental DEIS, based on the two circumstances that require preparation of a supplemental DEIS described below:

A supplemental DEIS must be prepared if either (1) [t]he agency makes substantial changes in the proposed action that are relevant to environmental concerns, or (2) [t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts (40 C.F.R. § 1502.9(c)(1) & (2)). See *Dubois v. U.S. Department of Agriculture*, 102 F.3d 1273, 1291-92 (1st Cir. 1996); *California v. Block*, 690 F.2d 753 (9th Cir.1982). See also *NRDC v. Hughes*, 437 F. Supp. 981, 990 (D.D.C. 1977).

Additional significant new information relevant to environmental concerns and bearing on the proposed action or its impacts has surfaced since I submitted that comment letter to you. Specifically, on October 17, 2012, the **Center for Biological Diversity filed a six-page Limited Appearance Statement** with the Office of the Secretary for the U.S. Nuclear Regulatory Commission (NRC) and the Atomic Safety and Licensing Board Panel of the NRC describing the legal insufficiencies of the Final EIS for the proposed Combined Licenses for Levy Nuclear Plant Units 1 and 2 ("LNP"), Docket Nos. 52-029 and NRC-2008-0558. A copy of that Limited Appearance Statement is incorporated into my comment letter as an attachment.

Because none of the impacts described in the Center for Biological Diversity's Limited Appearance Statement were addressed or even considered in the FEIS for the proposed LNP immediately east of the proposed Tarmac mine, none of those impacts were included or considered as adverse cumulative impacts in the DEIS for the proposed Tarmac mine, as required pursuant to 40 C.F.R. § 1502.9(c)(1) & (2). Therefore, a Supplemental DEIS for the proposed Tarmac mine also must consider those impacts from the proposed LNP, proposed Knight Mine and proposed Tarmac mine.

Proposed Tarmac Limestone Mine  
November 6, 2012

As I stated in my previous comment letter, in the absence of choosing the “No Action” alternative and denying the proposed Tarmac project, your agency cannot move forward with a final EIS without first preparing and releasing a supplemental DEIS to address the significant new circumstances and information relevant to environmental concerns and bearing on the proposed action and its impacts. Thank you for the opportunity to provide comments regarding the Tarmac DEIS.

Sincerely,



Sydney T. Bacchus, Ph. D.  
Hydroecologist  
appliedenvirserve@gmail.com

cc:

Jaclyn Lopez, Center for Biological Diversity, St. Petersburg, FL 33731  
Ecology Party of Florida, nonukes@ecologyparty.org  
Nuclear Information and Resource Service (NIRS), maryo@nirs.org  
Douglas Bruner, NRC LNP Project Manager, Douglas.Bruner@nrc.gov  
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Mark Sramek, NOAA Habitat Conservation Division, Mark.Sramek@noaa.gov

Attachments:

10/17/12 Limited Appearance Statement by Center for Biological Diversity Attorney Jaclyn Lopez



CENTER for BIOLOGICAL DIVERSITY

October 17, 2012

Office of the Secretary  
Rulemakings and Adjudications Staff  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001  
[hearingdocket@nrc.gov](mailto:hearingdocket@nrc.gov)

Alex S. Karlin, Chairman  
c/o: Mathew E. Flyntz, Law Clerk  
Atomic Safety and Licensing Board Panel  
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[Matthew.Flyntz@nrc.gov](mailto:Matthew.Flyntz@nrc.gov); [Sara.Culler@nrc.gov](mailto:Sara.Culler@nrc.gov)

**Re: Limited Appearance Statement, Levy COL, Docket Nos. 52-029-COL, 52-030-COL**

Greetings,

The letter outlines Center for Biological Diversity's (Center) concerns regarding the Nuclear Regulatory Commission (NRC) and U.S. Army Corps of Engineers' (Corps) final Environmental Impact Statement (FEIS), prepared in considering permit applications for Progress Energy Florida's (PEF) proposed Levy County nuclear power plants. The Center believes the FEIS may be legally insufficient as it fails to adequately assess the impacts on all relevant listed and proposed species under the Endangered Species Act (ESA), and because the agencies did not appear to complete the consultation requirements pursuant to the ESA and the National Environmental Policy Act (NEPA).<sup>1</sup>

Under NEPA, federal agencies, to the fullest extent possible, must prepare an Environmental Impact Statement (EIS) for every major federal action which will significantly affect the quality of the human environment.<sup>2</sup> The EIS requirement ensures that agencies take a "hard look" at the environmental consequences of an action and will have available, and carefully consider detailed information concerning those impacts.<sup>3</sup> Further, it guarantees that the relevant information will be made available to a larger audience which may also play a role in the decision making process and the implementation of that decision.<sup>4</sup> Meanwhile the purpose of the ESA is to conserve the

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<sup>1</sup> 42 U.S.C. § 4332(C)(v) (2006).

<sup>2</sup> 42 U.S.C. § 4332(C).

<sup>3</sup> *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349-50 (1989).

<sup>4</sup> *Id.*

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various species of fish, wildlife and plants that have come dangerously close to extinction,<sup>5</sup> and Congress intended the consultation process to prevent substantive violations of the act.<sup>6</sup> Pursuant to § 7 of the ESA, a federal agency funding or authorizing a project must consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to determine if the proposed action will jeopardize any listed or proposed species under the ESA.<sup>7</sup> The agency must conduct its own “[b]iological assessment for the purpose of identifying any endangered species or threatened species which is likely to be affected.”<sup>8</sup> Once consultation has begun, the agency shall not make any irreversible commitment of resources to the project which would foreclose some “reasonable and prudent” alternative which may be necessary to conserve a species under the ESA.<sup>9</sup> Further, agencies must use the best scientific and commercial data available,<sup>10</sup> and a final decision by an agency prior to completion of consultation by the USFWS may be considered “arbitrary, capricious, or an abuse of discretion” and be in violation of the Administrative Procedures Act (APA)<sup>11</sup> as the agencies would be entirely failing to consider an important aspect of the issue.<sup>12</sup> Upon review of the FEIS and consultation communications, it appears that the NRC and Corps have failed to fully comply with NEPA and the ESA as detailed below.

In August 2010 the NRC and Corps sought comments from USFWS and NMFS on their biological assessments (BA). NMFS expressed concerns about aquatic resources, stating that the plants’ construction and operation would adversely impact the estuarine water column, and emergent wetlands.<sup>13</sup> NMFS also feared that water intake would remove large amounts of planktonic life from the water including “[l]imited mobility egg and larval stages of fish and shellfish . . . as well as other estuarine and marine species of importance.”<sup>14</sup> In response, the NRC claimed it lacked the authority to address these concerns and instead encouraged the Corps to work with the Florida Department of Environmental Protection to resolve them.<sup>15</sup> The Corps acknowledged the problems highlighted by NMFS and stated that studies regarding essential fish habitat were continuing,<sup>16</sup> yet the consultation communications do not reference any further studies. Additionally, the only information for entrainment and impingement used in the FEIS

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<sup>5</sup> 16 U.S.C. § 1531 (a)–(b) (2006).

<sup>6</sup> *Sierra Club v. Marsh*, 816 F.2d 1376, 1389 (1987).

<sup>7</sup> 16 U.S.C. § 1536 (2006).

<sup>8</sup> 16 U.S.C. § 1536 (c)(1).

<sup>9</sup> 16 U.S.C. § 1536 (d).

<sup>10</sup> 16 U.S.C. § 1536 (a)(2).

<sup>11</sup> 5 U.S.C. § 706(2)(A) (2006).

<sup>12</sup> *Motor Vehicle Mfrs. Assn v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

<sup>13</sup> Ltr. from Miles Croom, Asst. Regional Adminstr. NMFS: Habitat Conservation Div., to Cindy Bladey, Chief, U.S. Nuclear Regulatory Commission: Rules, Announcements and Directives Branch, Div. of Admin. Services, and to Colonel Alfred Pantano Jr., Dist. Engr., Dept. of the Army: Jacksonville Dist. Corps. Of Engrs., *NOAA:NMFS, S.E. Region Comment on NRC, USACE’s Draft EIS dated Aug. 2010 for the Levy Nuclear Power Plant Units 1 and 2 Proposed by Progress Energy Florida*, at 3 (Oct. 26, 2010) (ML 103080057).

<sup>14</sup> *Id.* at 4.

<sup>15</sup> Ltr. from Scott Flanders, Dir., NRC Division of Site and Env. Reviews, to Miles Croom, Asst. Regional Adminstr. for Habitat Conservation Div., NMFS, *Response to Essential Fish Habitat Conservation Recommendations Regarding Proposed Levy Nuclear Power Plant Units 1 and 2*, at 2 (Dec. 22, 2010) (ML 110120632).

<sup>16</sup> Ltr. from Osvaldo Collazo, Chief, North Permits Branch, to Miles Croom, Asst. Regional Adminstr. for Habitat Conservation Div., NMFS, *Interim Response to Essential Fish Habitat Conservation Recommendations Regarding the Proposed Levy Nuclear Plant Units 1 and 2, and Associated Facilities* (Dec. 10, 2010) (ML 110120632).

was from a study in the early 1980's at the nearby Crystal River Energy Complex (CREC) facilities.<sup>17</sup> While it may provide context for the evaluation, this 25 plus year old study likely does not represent the best scientific data available today as required under the ESA.<sup>18</sup>

The Center is also concerned that impacts to manatees were not fully evaluated. Impacts from the warm water habitat loss from the transition from the old CREC facilities to the new plants on the Florida manatee lacks analysis.<sup>19</sup> Similarly, when evaluating the salinity increase from discharge from the proposed plants, the BA stated only a marginal impact would result due to mixing their discharge with the current CREC facilities' effluent.<sup>20</sup> However, once CREC facilities 1 and 2 are phased out, the proportion of total discharge from the proposed plants will not be the same and further analysis needs to be conducted to determine what impacts will result. NRC also concludes in its BA that the new boat ramp and warm water discharge might attract new recreational boating and fishing, which could lead to boat collisions with manatees, yet the NRC and FWS conclude that this impact is not likely to adversely impact the manatee.<sup>21</sup> NRC and FWS' reliance on the Manatee Key and a manatee protection plan, absent any analysis of the efficacy of such a plan or an analysis of the cumulative impacts of this project, likely violates the ESA and APA.

The Department of the Interior (DOI) also expressed its concern that more research needed to be completed to properly evaluate the potential impacts to protected species.<sup>22</sup> Specifically, the DOI advised the NRC and the Corps that it does not concur in the findings in table 8-1 on F-126 of the DEIS because no on-the-ground or targeted surveys were conducted for 12 federally protected species.<sup>23</sup> It also found that the list of plant species in the BA was likely incomplete, and that more research needed to be done on the protected Grasshopper Sparrow.<sup>24</sup> The NRC responded in February 2011 stating that a meeting was held the previous month and that it would reevaluate several protected species including additional habitat assessments and targeted surveys if necessary,<sup>25</sup> however, while a limited seasonal plant survey was conducted, neither the NRC, the Corps, nor PEF addressed the other issues raised by the DOI in the FEIS.

There are additional sensitive species which may be affected by the Levy County nuclear power plants' construction and operation. As stated in the DOI letter,<sup>26</sup> although 28 species were evaluated in the BA to the USFWS, the list may not be complete. The BA to the USFWS

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<sup>17</sup> U.S. Nuclear Regulatory Commission, Final Environmental Impact Statement, Docket 52-029, 52-030 Appendix F at F-28 (August 2010).

<sup>18</sup> *Id.*

<sup>19</sup> *Id.*

<sup>20</sup> U.S. N.R.C., Final EIS at F-23.

<sup>21</sup> U.S. N.R.C., Final EIS at F-168.

<sup>22</sup> Ltr. from Gregory Hogue, Reg'l. Environmental Officer, Dept. of the Interior, to US NRC: Chief Rulemaking and Directives Branch, *Comments for the Draft Environmental Impact Statement (DEIS) for Levy Nuclear Power Plants Units 1 and 2, Application for Combined Licenses (COLs) for Construction Permits and Operating Licenses* (Oct. 26, 2010) (ML 102990091).

<sup>23</sup> *Id.* at 2.

<sup>24</sup> *Id.*

<sup>25</sup> Ltr. from Scott Flanders, Dir., NRC Division of Site and Env. Reviews, to Gregory Hogue, Reg'l. Environmental Officer, Dept. of the Interior, *Response to Comments Received on the Biological Assessment for Proposed Levy Nuclear Power Plant Units 1 and 2* (Feb. 14, 2011) (ML 110200098).

<sup>26</sup> Ltr. from Gregory Hogue, at 2.

mentions impacts to amphibians several times, yet no amphibians are studied.<sup>27</sup> Also, the Floridan Aquifer hosts several sensitive species that might be impacted by the construction and operation of the plants.<sup>28</sup> The FWS recently issued positive 90-day findings under the ESA for dozens of these species including those listed below.<sup>29</sup> The FEIS does not address impacts to the Floridan Aquifer. If the proposed power plants will impact the Floridan Aquifer, the NRC and Corps should reinitiate consultation on the following species with positive 90-day findings:

Scientific Name:	Common Name:
<i>Eurycea wallacei</i>	Georgia Blind Salamander
<i>Crangonyx grandimanus</i>	Florida Cave Amphipod
<i>Crangonyx hobbsi</i>	Hobb's Cave Amphipod
<i>Cambarus cryptodytes</i>	Dougherty Plain Cave Crayfish
<i>Procambarus acherontis</i>	Orlando Cave Crayfish
<i>Procambarus attiguus</i>	Silver Glen Springs Crayfish
<i>Procambarus delicatus</i>	Bigcheek Cave Crayfish
<i>Procambarus erythrops</i>	Santa Fe Cave Crayfish
<i>Procambarus franzi</i>	Orange Lake Cave Crayfish
<i>Procambarus horsti</i>	Big Blue Springs Cave Crayfish
<i>Procambarus leitheuseri</i>	Coastal Lowland Cave Crayfish
<i>Procambarus lucifugus</i>	Florida Cave Crayfish
<i>Procambarus lucifugus</i> Alachua	Light Fleeing Cave Crayfish
<i>Procambarus lucifugus</i>	Florida Cave Crayfish
<i>Procambarus morrissi</i>	Putnam County Cave Crayfish
<i>Procambarus orcinus</i>	Woodville Karst Cave Crayfish
<i>Procambarus pallidus</i>	Pallid Cave Crayfish
<i>Troglocambarus maclanei</i>	Spider Cave Crayfish
<i>Aphaostracon asthenes</i>	Blue Spring Hydrobe Snail
<i>Aphaostracon chalarogyrus</i>	Freemouth Hydrobe Snail
<i>Aphaostracon monas</i>	Wekiva Hydrobe Snail
<i>Aphaostracon pycnus</i>	Dense Hydrobe Snail
<i>Aphaostracon theiocrenetum</i>	Clifton Spring Hydrobe Snail
<i>Floridobia mica</i>	Ichetucknee Siltsnail
<i>Floridobia monroensis</i>	Enterprise Siltsnail
<i>Floridobia parva</i>	Pygmy Siltsnail
<i>Floridobia ponderosa</i>	Ponderosa Siltsnail

<sup>27</sup> U.S. N.R.C., Final EIS at F-128,F-137,F-143,F-179.

<sup>28</sup> Stephen Walsh, *Freshwater Macrofauna of Florida Karst Habitats*, U.S. Geological Survey Water Resources Investigations Report, [http://water.usgs.gov/ogw/karst/kigconference/pdf/files/sjw\\_freshwater.pdf](http://water.usgs.gov/ogw/karst/kigconference/pdf/files/sjw_freshwater.pdf) 01-4011 (2001).

<sup>29</sup> Dept. of the Interior: Fish and Wildlife Service, *Endangered and Threatened Wildlife and Plants; Partial 90 Day Finding on a Petition to List 404 Species in the Southeastern United States as Endangered or Threatened With Critical Habitat*, Docket No. FWS-R4-ES-2011-0049, [http://www.biologicaldiversity.org/programs/biodiversity/1000\\_species/the\\_southeast\\_freshwater\\_extinction\\_crisis/pdfs/SE\\_Petition\\_90\\_day.pdf](http://www.biologicaldiversity.org/programs/biodiversity/1000_species/the_southeast_freshwater_extinction_crisis/pdfs/SE_Petition_90_day.pdf) (2011).

Floridobia wekiwae	Wekiwa Siltsnail
--------------------	------------------

Although these species are not yet listed as threatened or endangered, the NRC should engage in consultation or conference with the FWS on these species because once listing becomes effective, the prohibition against take, jeopardy, and adverse modification applies regardless of the action's stage of completion.<sup>30</sup>

Finally, Groundwater removal may impact the relative hydroperiod and availability of water around the site and needs to be studied further. The establishment of the facilities and stormwater ponds by PEF may lead to mechanical and passive dewatering of the area.<sup>31</sup> Dewatering affects the superficial aquifer, altering hydroperiods, and causing desiccation of soil.<sup>32</sup> The FEIS does not contain the final position of stormwater drainage ponds and without that data it is not possible to determine which areas will be affected most by this dewatering and investigate those impacts. Further, while the FEIS identifies a 20-mile geographic area of influence, wildlife surveys were only conducted on the site itself.<sup>33</sup> There are larger implications of altering the hydroperiod of an area as well. Dewatering has been shown to alter the impact natural wildfires have on the surrounding ecosystem<sup>34</sup> and increase the extent and severity of saltwater intrusion into nearby aquifers, namely the Floridan aquifer.<sup>35</sup> Impacts such as these were not considered in the FEIS and need to be addressed before the NRC and Corps issue permits to PEF.

In sum, the NRC and Corps' FEIS may not be legally sufficient as many imperiled species have not been evaluated, and parts of the FEIS analysis are based on outdated information. The NRC, Corps, and PEF should conduct additional analysis to adequately satisfy the requirements under the ESA and NEPA.

Sincerely,



Jaclyn Lopez  
Staff Attorney

<sup>30</sup> U.S. Fish and Wildlife Service and National Marine Fisheries Service, *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act*, [http://www.fws.gov/endangered/esa-library/pdf/esa\\_section7\\_handbook.pdf](http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf), at 6–2 (March 1998).

<sup>31</sup> Bacchus, S. T., *Nonmechanical dewatering of the regional Floridan aquifer system*, In Harmon, R. S. & C. Wicks (Eds.), *Perspectives on karst geomorphology, hydrology, and geochemistry – A tribute volume to Derek C. Ford and William B. White* (pp. 219-234). Geological Society of America Special Paper 404 (2006).

<sup>32</sup> Bacchus, S. T., *Uncalculated impacts of unsustainable aquifer yield including evidence of subsurface interbasin flow*, *Journal of American Water Resources Association* 36(3), 457-481 (2000).

<sup>33</sup> U.S. N.R.C. FEIS at 7–13.

<sup>34</sup> Bacchus, S. T., *More inconvenient truths: Wildfires and wetlands, SWANCC and Rapanos*. *National Wetlands Newsletter* 29(11), 15-21 (2007).

<sup>35</sup> Pokhrel, Y. N., Hanasaki, N., Yeh, P. J.-F., Yamada, T., Kanae, S. & Oki, T., *Model Estimates of Sea Level Change due to Anthropogenic Impacts on Terrestrial Water Storage*, *Nature Geoscience* (2012).

Courtesy Copies:  
Ecology Party  
Diane Curran

**From:** Ecology Party Chair [chair@ecologyparty.org]  
**Sent:** Monday, February 11, 2013 1:12 PM  
**To:** Sarfert, Edward P SAJ; Hambrick, Gordon A SAJ  
**Cc:** Sydney Bacchus; Jaclyn Lopez; HQ-PUBLIC AFFAIRS; cynthia-donner@fws.gov; beverly.brenda@epa.gov; mueller.heinz@epa.gov; miles.croom@noaa.gov; mark.sramek@noaa.gov; Diane Curran; Richard Webster  
**Subject:** Letter of adoption- LNP and Tarmac Mine DEIS & FEIS comments  
**Attachments:** EP letter-ACE LNP Tarmac EIS adopting Bacchus comments FINAL21013.pdf

Project Managers Hambrick and Sarfert:

Please see the Ecology Party of Florida's attached letter adopting the Levy Nuclear Plant DEIS and FEIS comments and the Tarmac Mine DEIS comments made by Dr. Sydney Bacchus. The letter also contains a list of additional information we will be sending separately.

Thank you.

Cara L. Campbell  
Chair, Ecology Party of Florida.

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Tired of our environment coming last?  
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[www.ecologyparty.org](http://www.ecologyparty.org)

 Ecology Party of Florida

**Cara Campbell, Chair**



February 10, 2013

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Regulatory Division  
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edward.p.sarfert@usace.army.mil

Re: Notice of adoption of comments and exhibits for proposed Levy Nuclear Plant (LNP) and Tarmac (aka "King Road") Mine Environmental Impact Statements (EIS)

Dear Mr. Hambrick and Mr. Sarfert:

With respect to the comments made by Dr. Sydney Bacchus regarding the Draft Environmental Impact Statement (DEIS) and Final Environmental Impact Statement (FEIS) for the proposed LNP and the Draft EIS for the proposed Tarmac mine that would supply the raw materials to construct the proposed LNP, the Ecology Party adopts and incorporates all of Dr. Bacchus's comments, attachments and exhibits as though fully set forth herein. Those comments and accompanying attachments and exhibits include, but are not limited to the following:

- 10/26/10 comment letter from Bacchus to Hambrick and Bruner re: preliminary comments on Draft EIS of Proposed Combined Licenses for LNP Units 1 and 2 (**Exhibit INT346 in Intervenors' NRC ASLB Hearing**);
- 11/27/10 comment letter from Bacchus to Hambrick and Bruner re: Supplemental comments on Draft EIS of Proposed Combined Licenses for LNP Units 1 and 2 (**Exhibit INT348 in Intervenors' NRC ASLB Hearing**);
- 3/12/12 comment letter from Bacchus to Hambrick and Bruner re: Second Supplemental Comments on EIS of Proposed Combined Licenses for LNP Units 1 and 2 (**Exhibit INT349 in Intervenors' NRC ASLB Hearing**); and
- 4/26/12 comment letter from Bacchus to Hambrick and Bruner re: Third Supplemental

Comments on EIS of Proposed Combined Licenses for LNP Units 1 and 2 (**Exhibit INT350 in Intervenor's NRC ASLB Hearing**);

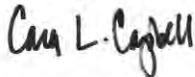
- 7/10/12 comment letter from Bacchus to Sarfert re: Supplemental Comments for EIS of Proposed Tarmac (aka "King Road") Mine;
- 11/6/12 comment letter from Bacchus to Sarfert re: Supplemental Comments and new information for EIS of Proposed Tarmac (aka "King Road") Mine;
- 12/2/12 comment letter from Bacchus to Sarfert re: Supplemental Comments and new information for EIS of Proposed Tarmac (aka "King Road") Mine;
- 12/3/12 comment letter from Bacchus to Hambrick re: Fourth Supplemental Comments and new information on EIS of Proposed Combined Licenses for LNP Units 1 and 2;

The Ecology Party also is providing additional new information since the release of the Final EIS for the proposed LNP and the Draft EIS for the proposed Tarmac mine. This new information, as listed below, is relevant to both of those documents and is provided as supplemental comments to be incorporated into the official file of record for the proposed LNP and the proposed Tarmac mine:

1. 10/31/12 Official Transcript for the NRC hearing re: the licensing of the proposed LNP.
2. 11/1/12 Official Transcript for the NRC hearing re: the licensing of the proposed LNP.
3. Prefiled direct and rebuttal testimonies, all attachments and exhibits by the Ecology Party's witnesses, for the above-referenced hearing.

The Ecology Party witnesses include: Dr. Sydney Bacchus, Dr. Timothy Hazlett, Mr. David Still, Mr. Gareth Davies. Transcripts of the NRC hearing will be forwarded to you by email and the remaining documents will be sent on a CD under separate cover by mail.

Sincerely,



Cara L. Campbell, Chair  
chair@ecologyparty.org

cc:

Dr. Sydney Bacchus (appliedenvirserve@gmail.com)  
Jaclyn Lopez, Center for Biological Diversity (jlopez@biologicaldiversity.org)  
Lt. General Robert Van Antwerp, Chief (hq-publicaffairs@usace.army.mil)  
Cindy Dohner, US Fish & Wildlife Service Region 4 Director (Cynthia\_Dohner@fws.gov)  
Gwendolyn Keys Fleming, USEPA Region 4 Administrator (Beverly.Brenda@epa.gov)  
Heinz Mueller, USEPA Region 4 Chief, NEPA Program Office (Mueller.Heinz@epa.gov)  
Miles M. Croom, NOAA Asst. Regional Admin. Habitat Conservation Div. (Miles.Croom@noaa.gov)  
Mark Sramek, NOAA Habitat Conservation Division (Mark.Sramek@noaa.gov)  
Diane Curran, Harmon Curran, Spellberg & Eisenberg (dcurran@harmoncurran.com)  
Richard Webster (rwebster463@gmail.com)

641 SW 6th Avenue, Fort. Lauderdale, FL 33315 (954) 525-4522

**From:** Ecology Party Chair [chair@ecologyparty.org]  
**Sent:** Monday, February 11, 2013 8:45 PM  
**To:** Sarfert, Edward P SAJ; Hambrick, Gordon A SAJ  
**Cc:** Sydney Bacchus; Jaclyn Lopez; HQ-PUBLIC AFFAIRS; cynthia\_dohner@fws.gov; beverly.brenda@epa.gov; mueller.heinz@epa.gov; miles.croom@noaa.gov; mark.sramek@noaa.gov; Diane Curran; Richard Webster  
**Subject:** LNP Hearing Transcripts  
**Attachments:** Hearing transcript day 1 plain.pdf; Hearing transcript 2 plain.pdf; LNP Hearing transcript correctons.pdf

Project Managers Hambrick and Sarfert:

Attached are the October 31, 2012 and November 1, 2012 transcripts for the NRC hearing on the proposed LNP as well as the transcript corrections accepted by the Atomic Safety Licensing Board. As mentioned in our previous letter (adopting Dr. Bacchus's comments on the LNP DEIS and FEIS and the Tarmac DEIS), the Ecology Party is submitting these as additional information relevant to those EIS documents.

Thank you.

Cara L. Campbell  
Chair, Ecology Party of Florida.

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 Ecology Party of Florida

**Cara Campbell, Chair**

**Harmon, Curran, Spielberg + Eisenberg LLP**



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February 20, 2013

Gordon A. Hambrick III, Senior Project Manager, LNP  
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Edward Sarfert, Project Manager, Tarmac  
U. S. Department of the Army Corps of Engineers  
Regulatory Division  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502-5794

SUBJECT: *Documents from NRC Hearing on Proposed Levy Nuclear Plant*

Dear Mr. Hambrick and Mr. Sarfert:

Cara Campbell of the Ecology Party of Florida has asked me to send each of you a CD with the testimony and exhibits submitted to the U.S. Nuclear Regulatory Commission (NRC) by the Ecology Party and the Nuclear Information and Resource Service (NIRS) regarding their contention that the NRC's Environmental Impact Statement inadequately addressed the potentially significant impacts of the Levy reactors on fresh-water wetlands. We had a hearing on the issue October 31 and November 1, 2012, and are awaiting a decision from the NRC's Atomic Safety and Licensing Board (ASLB).

The enclosed CD contains the Ecology Party's and NIRS' direct testimony and exhibits, rebuttal testimony exhibits, statement of position, response statement of position, and transcripts of two days of hearings. I am also including our proposed findings of fact and conclusions of law, which provide a helpful overview of the evidence.

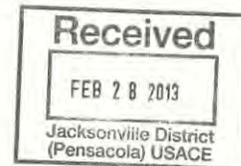
Please note that several pieces of testimony are red-lined, reflecting the exclusion from the hearing of some evidence that the ASLB ruled extraneous to the scope of the contention. Those red-lined portions may nevertheless be relevant to your deliberations.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Diane Curran  
Counsel for Ecology Party and NIRS

Cc: Cara Campbell



**From:** Sydney [appliedenvirserve@gmail.com]  
**Sent:** Thursday, March 14, 2013 9:09 PM  
**To:** Hambrick, Gordon A SAJ; Sarfert, Edward P SAJ; Fellows, John P SAJ; Ecology Party of Florida; Michael Mariotte; HQ-PUBLIC AFFAIRS; Diane Curran; Gwendolyn Keyes Fleming; Heinz Mueller; Karrie-Jo Shell; Lloyd Generette; Mark Sramek; Miles M. Croom; Paul Gagliano; Ramona Mcconney; Rick Button; Ron Miedema; Traci Buskey; Able, Tony EPA@SAD; Duncan Powell; John Rehill  
**Cc:** FYI  
**Subject:** New Information/Supplemental Comments on EIS for proposed LNP and mining  
**Attachments:** Bacchus LNP Tarmac areawide mining EIS supplemental comment ltr31313.pdf

Dear Project Managers Hambrick, Sarfert and O'Kane,

Please see the attached pdf file with new information and my supplemental comments on the proposed LNP, proposed Tarmac mine and additional mining addressed in the Areawide EIS of Mining Impacts:

Bacchus LNP Tarmac areawide mining EIS supplemental comment ltr31313.pdf

Thank you for the opportunity to provide public comments.

Sydney Bacchus, Ph. D.

Hydroecologist



P.O. Box 174 • Athens, GA 30603-0174

March 13, 2013

Don Hambrick, Senior Project Manager (LNP, SAJ-208-00490)  
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Kevin D. O'Kane, Chief/Project Manager, Areawide EIS on Mining Impacts  
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John.P.Fellows@usace.army.mil

Re: **New Information - Supplemental Environmental Impact Statements (EIS) Required for Proposed**  
Combined Licenses for Levy Nuclear Plant (LNP) Units 1 and 2, Docket Nos. 52-029 and NRC-2008-0558  
Project No. SAJ-208-00490 (IP-GAH)  
Tarmac Mine, Levy County  
Areawide EIS on Mining Impacts, Floridan aquifer system

Dear Project Managers Hambrick, Sarfert and O'Kane:

I am submitting these supplemental comments and new information, generated since the releases of the draft and/or final EIS documents for the three proposed, inter-related projects referenced above, on behalf of the Ecology Party of Florida and on my behalf. Previous comments submitted to you regarding the proposed LNP, proposed Tarmac mine, which would supply the raw materials for construction of the proposed LNP, and additional mining addressed in the Areawide EIS of Mining Impacts, described various ways that these proposed projects would result in irreversible adverse direct, indirect and cumulative impacts to the Floridan aquifer system and other environmental harm.

**Recent Sinkholes Along Fractures, Linked to Mines, Resulted in Deaths and Private Property Damage Due to Aquifer Depletion from Existing Mining and Groundwater Withdrawals**

According to the Palm Beach Post and USA Today, respectively, new sinkholes opened on February 28, 2013 and March 3, 2013 in Seffner, Florida, which is in Hillsborough County. Extensive mining is occurring and proposed in that county and surrounding counties. Although both new sinkholes caused damage to private property, the first also resulted in the death of Jeff Bush, when he and the bedroom of his house were swallowed by that sinkhole while he was sleeping. Based on information from the Florida Geological Survey, the coordinates for those sinkholes are:

1st Seffner sinkhole: 27.971181 N, -82.281159 W  
2nd Seffner sinkhole: 27.988304 N, -82.294728 W

I entered those coordinates into Arc GIS with the other sinkhole locations available from the state's sinkhole data base maintained by the University of South Florida (<http://fcit.usf.edu/florida/maps/galleries/sinkholes/>). Please note that data base reportedly has not been updated since 2008. Then I created two maps related to those new sinkholes. The methods used to create these maps were described in the following publication that was submitted to you electronically with my previous comments:

J. P. Lines, S. Bernardes, J. He, S. Zhang, S. T. Bacchus, M. Madden, T. Jordan, 2012, Preferential Groundwater Flow Pathways and Hydroperiod Alterations Indicated by Georectified Lineaments and Sinkholes at Proposed Karst Nuclear Power Plant and Mine Sites, *Journal of Sustainable Development* 5(12)78-116.

The first map, incorporated into this comment letter as **Attachment A**, shows the locations of the sinkholes from the 2008 data base as blue circles. The two new sinkholes are shown as yellow circles and are located in the NW corner of the map under the north symbol.

The yellow diagonal lines in that map represent the fractures that were mapped for the Florida Geological Survey and published by Vernon in 1951. The extensive network of red diagonal lines in Attachment A are the fractures that were mapped by the Remote Sensing Section of the Florida Department of Transportation and released in 1973, but neither was published previously in an electronic version. The white square outline in the center of Attachment A is an area of dense mining that has occurred in Hillsborough, Polk, Hardee and Manatee Counties, showing how the network of fractures and sinkholes are connected to those mines.

Attachment B is an enlargement of that area showing numerous individual mines located in the four corners of those counties and that the mines were excavated in areas with fractures or in close proximity to fractures that connect directly to the previously mapped and new sinkholes. As described in the publication referenced above by Lines et al., sinkholes are known to occur along or in close proximity to fractures. The base map used for both of those attachments was satellite imagery from Bing.

The two media articles describing the two new sinkhole catastrophes are incorporated into this comment letter as Attachments C and D and the links to those articles include video footage of the disaster. None of the EIS documents for any of the proposed projects referenced above took a hard look at how groundwater alterations from those projects would affect the surrounding vicinities or the regional Floridan aquifer system or the other adverse environmental impacts that would occur from the damage to the aquifer. Nor did those documents adequately take into consideration the potential for causing lethal sinkhole damage. **Therefore, a supplemental EIS is required for your agencies to take a hard look at all of these cumulative impacts.**

Sincerely,



Sydney T. Bacchus, Ph. D.  
Hydroecologist  
[appliedenvirserve@gmail.com](mailto:appliedenvirserve@gmail.com)

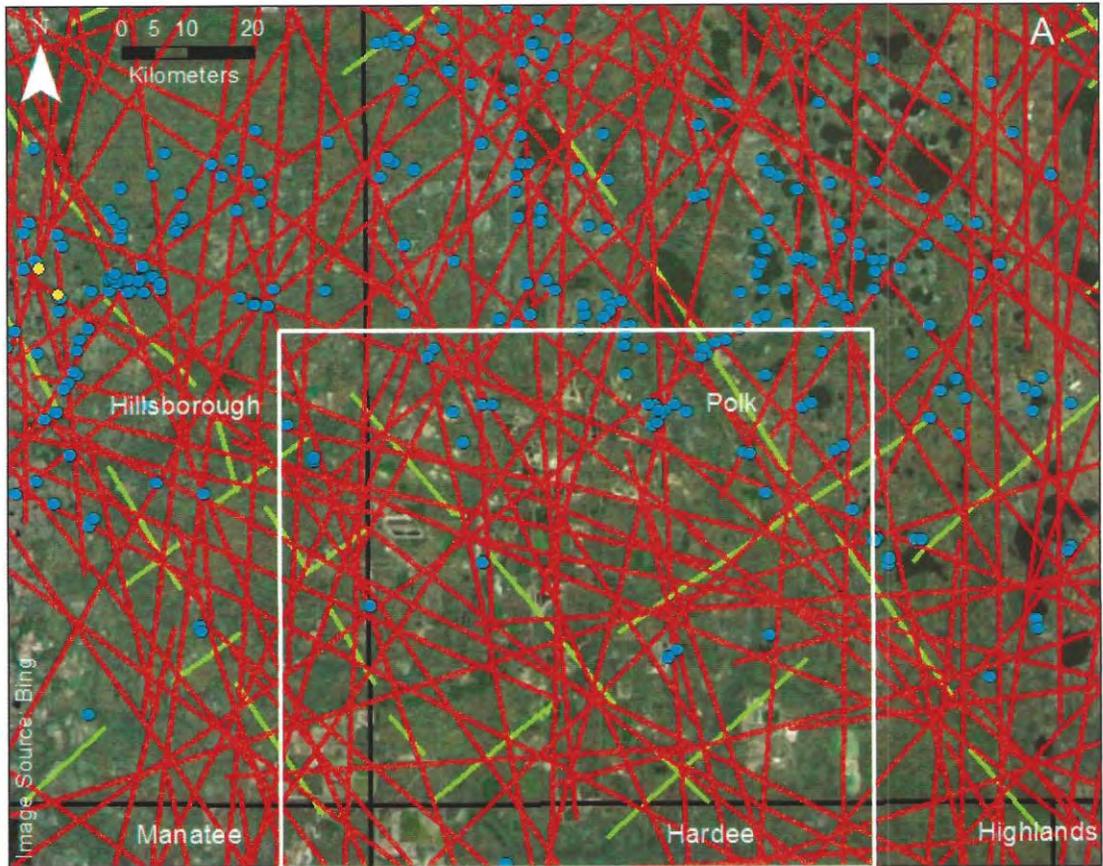
Attachments:

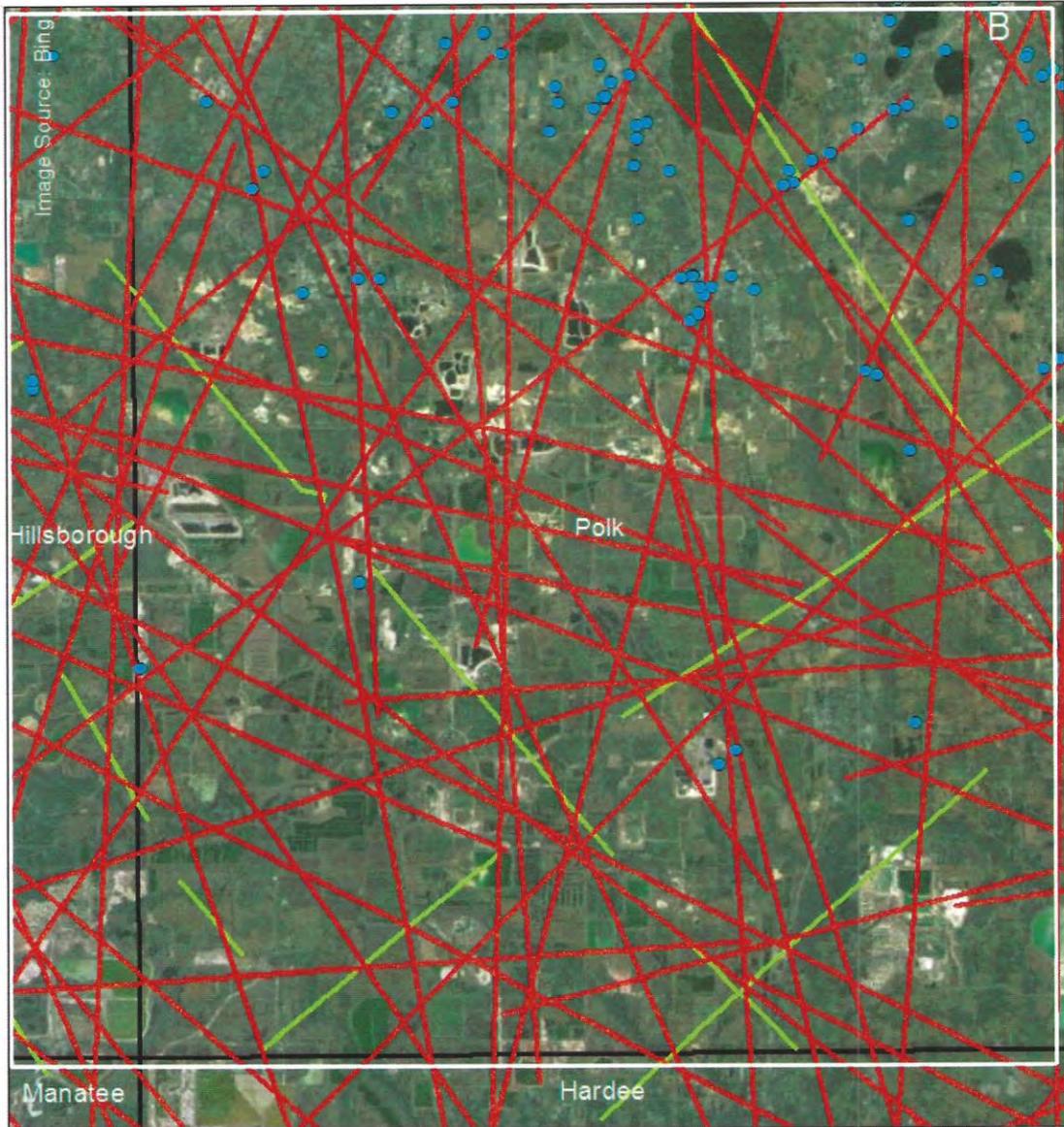
- A. Map of two new sinkholes with other sinkholes and fractures
- B. Map of enlarged mining area with same fractures and sinkholes
- C. News article about the first new sinkhole
- D. News article about the second new sinkhole

cc:

Cara L. Campbell, Chair, Ecology Party of Florida  
Michael Mariotte, Director, Nuclear Information and Resource Service (NIRS)  
Lt. General Robert Van Antwerp, Chief of Engineers, [hq-publicaffairs@usace.army.mil](mailto:hq-publicaffairs@usace.army.mil)  
Diane Curran, Harmon, Curran, Spielberg + Eisenberg, LLP  
Cindy Dohner, US Fish & Wildlife Service Region 4 Director (fax: 404/679-4006)  
Gwendolyn Keys Fleming, USEPA Region 4 Administrator (fax: 404/562-8174)  
Heinz Mueller, USEPA Region 4 Chief, NEPA Program Office

Paul Gagliano, USEPA Region 4  
Traci Buskey, USEPA Region 4  
Rick Button, USEPA Region 4  
Lloyd Generette, USEPA Region 4  
Ramona McConney, USEPA Region 4  
Ron Miedema, USEPA Region 4  
Karrie-Jo Shell, USEPA Region 4  
Miles M. Croom, NOAA Assistant Regional Administrator Habitat Conservation Division  
Mark Sramek, NOAA Habitat Conservation Division  
John Rehill, Bradenton Times





ATTACHMENT C

<http://www.palmbeachpost.com/ap/ap/top-news/tampa-area-man-swallowed-by-sinkhole/nWdSP/>

By CHRIS O'MEARA

The Associated Press

SEFFNER, Fla. —

A police spokesman in Florida says they are starting a recovery effort to find a man who was swallowed up by a sinkhole at his home.

Hillsborough County Sheriff's Office spokesman Larry McKinnon said Friday they asked sinkhole and engineering experts to come to the home near Tampa. The experts are using equipment to see if the ground can support the weight of heavy machinery that is needed for the recovery effort.

Jeremy Bush, who was home at the time, says he fears his brother Jeff has died. He ran into his brother's bedroom when he disappeared into the sinkhole Thursday night, but he says he could not save him.

Copyright The Associated Press

**ATTACHMENT D**

<http://www.usatoday.com/story/news/nation/2013/03/04/sinkhole-seffner-florida/1963175/>

Another suspected sinkhole opens up in a Fla. neighborhood

WTSP-TV, Tampa-St. Petersburg, Fla.5:47p.m. EST March 4, 2013

WTSP-TV, Tampa-St. Petersburg, Fla.5:47p.m. EST March 4, 2013

This apparent sinkhole is about two miles from where one opened up on Thursday, killing a man whose bedroom was above it.

Another sinkhole appears to have opened up in a Seffner, Fla., neighborhood, the second time in less than a week.

Hillsborough County Fire Rescue and code enforcement have responded to Cedar Tree Lane to determine if it is safe for families to stay in their homes.

Sky 10 footage shows the hole is about 10 feet across, and is straddling across a fence, affecting at least two properties.

That location is about two miles from where a sinkhole opened up underneath a house Thursday night, killing Jeff Bush. Crews are in the process of demolishing that home.

STORY: Demolition reveals huge sinkhole

<<http://www.usatoday.com/story/news/nation/2013/03/04/sinkhole-home-florida/1961997/>>

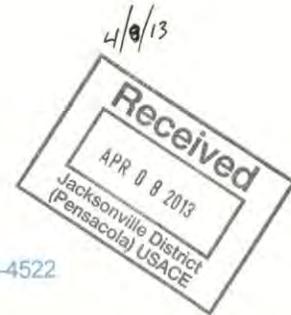
MORE: Additional coverage from WTSP

<<http://www.wtsp.com/news/topstories/article/302137/250/Another-suspected-sinkhole-opens-up-in-Seffner>>



641 SW 6th Avenue, Fort. Lauderdale, FL 33315 (954) 525-4522

March 29, 2013



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<http://www.kingroadeis.com/>

Col. Alan M. Dodd, District Engineer, Areawide EIS for Mining  
US Army Corps of Engineers (COE)  
P.O. Box 4970, 701 San Marco Blvd.  
Jacksonville, FL 32207  
Alan.M.Dodd@usace.army.mil

Re: New Information and Supplemental Comments for proposed Levy Nuclear Plant (LNP),  
Tarmac (aka "King Road") Mine and Areawide Mining Environmental Impact Statements (EIS)

Dear Mr. Hambrick, Mr. Sarfert and Col. Alan Dodd,

On February 10, 2013, the Ecology Party of Florida submitted a letter to your agency adopting and incorporating all of the comments provided to your agency by Dr. Sydney Bacchus with respect to the Environmental Impact Statements for the projects referenced above. Our letter also provided additional new information and supplemental information since the release of those EIS documents for the proposed LNP and the Draft EIS for the proposed Tarmac mine.

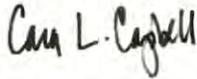
That new information included the official transcript for the NRC hearing on October 31, 2012 and November 1, 2012, for the licensing of the proposed LNP. The transcript for the second day of that hearing included sworn testimony by Mr. Peter G. Hubbell, the former Executive Director of the Southwest Florida Water Management District ("SWFWMD").

The purpose of this letter is to provide additional new information, evidence and supplemental comments that refute Mr. Hubble's sworn testimony and to adopt and incorporate all of the comments provided to your agency on the EIS documents referenced above by Norma Killebrew. The new information, evidence and supplemental comments include a sworn affidavit prepared by Norma Killebrew, dated March 28, 2013, and the two exhibits and Attachments A through F incorporated into her affidavit.

In addition to refuting Mr. Hubble's testimony, Mrs. Killebrew's sworn affidavit, exhibits and attachments also provide clear evidence of the significant direct, indirect and cumulative harm already suffered by the regional Floridan aquifer system and SWFWMD's failure to mitigate that harm. This is the same aquifer system that would be harmed by the proposed LNP and Tarmac Mine and any additional mining within the SWFWMD boundaries and surrounding water management district boundaries.

An electronic copy of Mrs. Killebrew's sworn affidavit, with Exhibit 1 and Exhibit 2, Attachments A through E, is attached. Mrs. Killibrew will forward a CD with a copy of this letter with all exhibits and attachments under separate cover by mail. Please ensure that these documents are considered and included in each of the EIS file of record for the proposed projects referenced above.

Sincerely,



Cara L. Campbell, Chair  
chair@ecologyparty.org

Attachment

cc:

Norma Killebrew (Tiff313@aol.com)  
Dr. Sydney Bacchus (appliedenvirserve@gmail.com)  
Jaclyn Lopez, Center for Biological Diversity (jlopez@biologicaldiversity.org)  
Michael Mariotte, Nuclear Information and Resource Service (NIRSnet@nirs.org)  
Lt. General Thomas Bostick, Chief (usarmy.pentagon.hqdaoce.mbxdaen-zc@mail.mil)  
Cindy Dohner, US Fish & Wildlife Service Region 4 Director (Cynthia\_Dohner@fws.gov)  
Gwendolyn Keys Fleming, USEPA Region 4 Administrator (Beverly.Brenda@epa.gov)  
Heinz Mueller, USEPA Region 4 Chief, NEPA Program Office (Mueller.Heinz@epa.gov)  
Miles M. Croom, NOAA Asst. Regional Admin. Habitat Conservation Div.

2

(Miles.Croom@noaa.gov)  
Mark Sramek, NOAA Habitat Conservation Division (Mark.Sramek@noaa.gov)

**From:** Ecology Party Chair [chair@ecologyparty.org]  
**Sent:** Monday, April 22, 2013 7:55 PM  
**To:** Hambrick, Gordon A SAJ; Sarfert, Edward P SAJ  
**Cc:** Diane Curran; Sydney Bacchus; Jaclyn Lopez; Michael Mariotte; HQ-PUBLIC AFFAIRS; cynthia\_dohner@fws.gov; beverly.brenda@epa.gov; mueller.heinz@epa.gov; miles.croom@noaa.gov; mark.sramek@noaa.gov  
**Subject:** Levy Nuclear Plant and Tarmac mine- New Information and Supplemental Comments  
**Attachments:** TJ Declaration Sworn Affidavit rev41913\_signed.pdf; EP final letter-COE LNP Tarmac EIS Jordan affidavit42213.pdf

Dear Mr. Hambrick and Mr. Sarfert:

Attached is an affidavit by Dr. Thomas Jordan of the University of Georgia's Center for Remote Sensing. The affidavit incorporates two exhibits: Dr. Jordan's CV and the 2012 peer-reviewed publication he co-authored (previously submitted to you by Dr. Sydney Bacchus), titled "Preferential Groundwater Flow Pathways and Hydroperiod Alterations Indicated by Georectified Lineaments and Sinkholes at Proposed Karst Nuclear Power Plant and Mine Sites." Dr. Jordan's affidavit clarifies issues from the Atomic Safety and Licensing Board (ASLB) hearing transcript of October 31, 2012, submitted to you on February 11, 2013. Specifically, in the transcript (page 1279, lines 13 to page 1284, line 17, and page 1291, line 18 to page 1306, line 5), there is discussion of maps Dr. Bacchus submitted containing locations of lineaments; these are the same locations in the aforementioned publication (Exhibit B) accompanying Dr. Jordan's affidavit.

It is vital the Corps understand clearly the genesis of the lines on the maps in question, and that the lines represent fractures identified and verified by various experts in mapping those types of remotely-sensed features (e.g., geologists Vernon, Faulkner, and remote sensing staff of the Florida Department of Transportation). It's also vital that you understand those geologic features cannot be discerned by people lacking the specialized training, equipment and the historic aerial photographs and satellite imagery used to map those geologic features in 1951 and 1973. That concept is explained in Exhibit B.

Also attached is the pdf version of my cover letter. Please do me the favor of confirming that you received both attachments.

Thank you for your attention to this matter.

Cara Campbell

Sick of the corporate duopoly?  
Tired of our environment coming last?  
Join a serious third party.  
[www.ecologyparty.org](http://www.ecologyparty.org)

 Ecology Party of Florida

**Cara Campbell, Chair**



April 22, 2013

Gordon A. Hambrick III, Senior Project Manager, LNP  
U. S. Department of the Army Corps of Engineers (Corps)  
Jacksonville District  
1002 West 23rd Street, Suite 350  
Panama City, Florida 32401  
Gordon.a.hambrick@usace.army.mil  
850/763-0717 ext. 25

Edward Sarfert, Project Manager, Tarmac  
U. S. Department of the Army Corps of Engineers  
Regulatory Division  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502-5794  
edward.p.sarfert@usace.army.mil  
<http://www.kingroadeis.com>

Re: New Information and Supplemental Comments for proposed Levy Nuclear Plant (LNP) and Tarmac (aka "King Road") Mine Environmental Impact Statements (EIS)

Dear Mr. Hambrick and Mr. Sarfert:

Attached is an affidavit by Dr. Thomas Jordan of the University of Georgia's Center for Remote Sensing. The affidavit incorporates two exhibits: Dr. Jordan's CV and the 2012 peer-reviewed publication he co-authored (previously submitted to you by Dr. Sydney Bacchus), titled "Preferential Groundwater Flow Pathways and Hydroperiod Alterations Indicated by Georectified Lineaments and Sinkholes at Proposed Karst Nuclear Power Plant and Mine Sites." Dr. Jordan's affidavit clarifies issues from the Atomic Safety and Licensing Board (ASLB) hearing transcript of October 31, 2012, submitted to you on February 11, 2013. Specifically, in the transcript (page 1279, lines 13 to page 1284, line 17, and page 1291, line 18 to page 1306, line 5), there is discussion of maps Dr. Bacchus submitted containing locations of lineaments; these are the same locations in the aforementioned publication (Exhibit B) accompanying Dr. Jordan's affidavit.

It is vital the Corps understand clearly the genesis of the lines on the maps in question, and that the lines represent fractures identified and verified by various experts in mapping those types of remotely-sensed features (e.g., geologists Vernon, Faulkner, and remote sensing staff of the Florida Department of Transportation). It's also vital that you understand those geologic features cannot be discerned by people lacking the specialized training, equipment and the historic aerial photographs and satellite imagery used to map those geologic features in 1951 and 1973. That concept is explained in Exhibit B.

Sincerely,

A handwritten signature in black ink that reads "Cara L. Campbell".

Cara L. Campbell, Chair  
[chair@ecologyparty.org](mailto:chair@ecologyparty.org)

cc:

Diane Curran, Esq., Harmon, Curran, Spellberg + Eisenberg ([dcurran@harmoncurran.com](mailto:dcurran@harmoncurran.com))  
Dr. Sydney Bacchus ([appliedenvirserve@gmail.com](mailto:appliedenvirserve@gmail.com))  
Jaclyn Lopez, Center for Biological Diversity ([jlopez@biologicaldiversity.org](mailto:jlopez@biologicaldiversity.org))  
Michael Mariotte, Nuclear Information and Resource Service ([NIRSnet@nirs.org](mailto:NIRSnet@nirs.org))  
Lt. General Robert Van Antwerp, Chief ([hq-publicaffairs@usace.army.mil](mailto:hq-publicaffairs@usace.army.mil))  
Cindy Dohner, US Fish & Wildlife Service Region 4 Director ([Cynthia\\_Dohner@fws.gov](mailto:Cynthia_Dohner@fws.gov))  
Gwendolyn Keys Fleming, USEPA Region 4 Administrator ([Beverly.Brenda@epa.gov](mailto:Beverly.Brenda@epa.gov))  
Heinz Mueller, USEPA Region 4 Chief, NEPA Program Office ([Mueller.Heinz@epa.gov](mailto:Mueller.Heinz@epa.gov))  
Miles M. Croom, NOAA Asst. Regional Admin. Habitat Conservation Div. ([Miles.Croom@noaa.gov](mailto:Miles.Croom@noaa.gov))  
Mark Sramek, NOAA Habitat Conservation Division ([Mark.Sramek@noaa.gov](mailto:Mark.Sramek@noaa.gov))  
641 SW 6th Avenue, Fort. Lauderdale, FL 33315 (954) 525-4522



May 31, 2013

John Fellows, Project Manager, areawide expansion of phosphate mining  
U. S. Department of the Army Corps of Engineers (Corps)  
10117 Princess Palm Avenue, Suite 120  
Tampa, Florida 33610-8302  
john.p.fellows@usace.army.mil

Gordon A. Hambrick III, Senior Project Manager, LNP  
U. S. Department of the Army Corps of Engineers  
Jacksonville District  
1002 West 23rd Street, Suite 350  
Panama City, Florida 32401  
gordon.a.hambrick@usace.army.mil

Edward Sarfert, Project Manager, Tarmac  
U. S. Department of the Army Corps of Engineers  
Regulatory Division  
41 North Jefferson St., Suite 301  
Pensacola, FL 32502-5794  
edward.p.sarfert@usace.army.mil

Re: Notice of adoption, supplemental comments and new information for EIS review of proposed areawide increase in phosphate mining, Levy Nuclear Plant (LNP) and Tarmac (aka "King Road") Mine

Dear Project Managers:

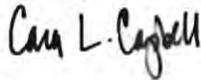
I previously notified you that the Ecology Party of Florida (Ecology Party) adopts and incorporates all of the previous comments, attachments and exhibits provided by Dr. Sydney Bacchus on the proposed projects referenced above. By copy of this letter, the Ecology Party also adopts and incorporates all of the previous comments, attachments and exhibits provided by Dr. Nora Demers, including scoping comments, for the areawide Environmental Impact Statement (EIS) and all the previous comments, attachments and exhibits provided by Norma Killebrew, including scoping comments, for the three projects referenced above.

Additionally, the Ecology Party is providing the attached sworn affidavit of Dr. Bacchus, which includes her most recent supplemental comments and new information on the three proposed projects referenced above. Her affidavit and exhibits describe and depict the locations of three new sinkholes associated with fractures that extend to and through one cluster of active mines allegedly evaluated by the final areawide EIS. Her affidavit also describes her comments and documents previously submitted related to hydroecological and other adverse impacts that apparently were removed from the EIS at the request of the mining applicants.

Dr. Bacchus also describes contradictions in the deadline for comments imposed by the Corps for the areawide EIS, with serious ramifications to the public comment process. As a remedy for problem, Dr. Bacchus has requested that the Corps re-advertise the final areawide EIS in the federal register and re-notify the public by mail, providing a formal public comment period not less than 60-days in length. The Ecology Party supports this recommended remedy.

Finally, the Ecology Party is advising the Corps that additional comments and documents provided by Norma Killebrew in her sworn affidavit dated March 28, 2013, and Southwest Florida Water Management District (SWFWMD) documentation of irreversible lowering of the water levels by Mosaic mining in proximity to her family's ranch, also were excluded from the final areawide EIS. Those documents and Ms. Killebrew's long-term documentation of additional permit violations by Mosaic in her extensive sworn affidavit support the conclusion that either a supplemental areawide EIS is required or no additional phosphate mining should be permitted because of the extensive, irreversible cumulative damage that already has occurred.

Sincerely,



Cara L. Campbell, Chair  
chair@ecologyparty.org

Attachment

cc:

Lt. General Robert Van Antwerp, Chief (hq-publicaffairs@usace.army.mil)  
Cindy Dohner, US Fish & Wildlife Service Region 4 Director (Cynthia\_Dohner@fws.gov)  
Gwendolyn Keys Fleming, USEPA Region 4 Administrator (Beverly.Brenda@epa.gov)  
Heinz Mueller, USEPA Region 4 Chief, NEPA Program Office (Mueller.Heinz@epa.gov)  
Arturo E. Torres, Chief Hydrologic Investigations Section, Tampa USGS (aetorres@usgs.gov)  
Miles M. Croom, NOAA Asst. Regional Admin. Habitat Conservation Div. (Miles.Croom@noaa.gov)  
Mark Sramek, NOAA Habitat Conservation Division (Mark.Sramek@noaa.gov)  
Diane Curran, Harmon Curran, Speilberg & Eisenberg (dcurran@harmoncurran.com)  
Richard Webster (rwebster463@gmail.com)  
Jaclyn Lopez, Center for Biological Diversity (jlopez@biologicaldiversity.org)  
Glenn Compton, ManaSota-88 (ManaSota88@comcast.net)  
Dr. Sydney Bacchus (appliedenvirserve@gmail.com)  
Dr. Nora Demers (roynora@comcast.net)  
Norma Killebrew (Tiff313@aol.com)  
John Rehill, Bradenton Times (john.rehill@thebradentontimes.com)

641 SW 6th Avenue, Fort. Lauderdale, FL 33315 (954) 525-4522

**DECLARATION OF SYDNEY T. BACCHUS  
REGARDING NEW INFORMATION AND SUPPLEMENTAL COMMENTS  
RELEVANT TO THE  
UNITED STATES ARMY CORPS OF ENGINEERS'  
ENVIRONMENTAL IMPACT STATEMENTS  
FOR  
AREAWIDE PHOSPHATE MINING  
AND PROPOSED  
PROGRESS ENERGY FLORIDA, INC.  
LEVY COUNTY NUCLEAR POWER PLANT UNITS 1 AND 2  
AND TARMAC MINE IN FLORIDA**

I, Sydney T. Bacchus, declare as follows:

1. My name is Sydney T. Bacchus. I am more than eighteen years of age and am competent to make this Declaration based on personal knowledge and experience.
2. **My Expertise** - I hold a doctoral degree from the University of Georgia in the multidisciplinary field of hydroecology. My educational and professional background and experience and peer-reviewed scientific publications are provided in my curriculum vitae, which is incorporated herein as **Attachment 1**.
3. **My Previous Comments** - The United States Army Corps of Engineers (Corps) conducted segmented Environmental Impact Statements (EIS) for: (a) the areawide phosphate mining; (b) the proposed Progress Energy Florida, Inc. (PEF) Levy County Nuclear Power Plant Units 1 and 2 (LNP); and (c) the proposed Tarmac mine – all located within the Southwest Florida Water Management District (SWFWMD) and the regional, karst Floridan aquifer system. I provided extensive comments, exhibits and attachments to the Corps on all of those EIS documents. My comments included new information relevant to those EIS documents that had become available since my previous comments.
4. Specifically regarding the areawide EIS for phosphate mining, I contributed to comments and supporting documents submitted by Dr. Nora Demers on April 22, 2011 and June 29, 2011. I adopt Dr. Demers' comment letters by reference at this time. I also submitted supplemental comments on February 27, 2012 and March 13, 2013. Supporting documents also accompanied both of those comment letters.
5. The comments I submitted to the Corps on March 13, 2013 provided new information related to all three of the segmented EIS documents referenced above. That comment letter and four attachments included information and locations of recent sinkholes, including a lethal sinkhole, associated with fractures that extend to the phosphate mines allegedly evaluated in the Corps' areawide EIS. A copy of that comment letter and attachments is incorporated herein as **Attachment 2**.
6. **Notice of Availability Letter** - On May 16, 2013, I received a notice from the Corps dated April 26, 2013. That notice was signed by Kevin D. O'Kane, Chief, Tampa Section and included a compact disc (CD) of the "Notice of Availability of the Final Areawide Environmental Impact Statement (AEIS) on Phosphate Mining in the Central Florida Phosphate District." The return address was, "CH2MHILL, 3011 S.W. Williston Road, Gainesville, FL 32608-3928." A copy of that notice is incorporated herein as **Attachment 3**.
7. I have confirmation that the Corps' project managers for the segmented EIS projects referenced above received my comment letter dated and sent on March 13, 2013 and the referenced attachments.
8. **30-Day Comment Period** - The final paragraphs of that notice stated:  
Any comments you may have must be submitted within 30 days of the date on which the

NOA appears in the Federal Register, which is expected to be on May 3, 2013. Comments may be provided in writing to the letterhead address or by email to [teamaeis@phosphateaeis.org](mailto:teamaeis@phosphateaeis.org).

Questions concerning the project, or requests for additional copies of the Final AEIS should be directed to John Fellows, by phone at 813/769-7070, or email at [john.p.fellows@usace.army.mil](mailto:john.p.fellows@usace.army.mil). Thank you for your interest in the Final AEIS.

9. The final AEIS included 23 chapters. The single chapter including the public comments (Chapter 14 – Appendix A) had a total of 1458 pages. Considering the sheer magnitude of the final areawide EIS, the fact that the public waited for decades for your agency to prepare this long-overdue document and the fact that the comment period for other final EIS documents of similar or less magnitude provided comment periods of at least 45 days or 60 days, the 30-day comment period is additional evidence that the Corps has no interest in allowing thorough comments from the public on this final areawide EIS. In a futile attempt to remedy this fatal error, John Fellows sent an email to a member of the public concerned about the inadequate 30-day review period for comments stating that, “the Corps will accept comments on the Final AEIS up until we make our final decision.” A copy of that email is incorporated herein as **Attachment 4**.

10. The following statement in Mr. O’Kane’s Notice of Availability letter dated April 26, 2013, clearly contradicts the referenced email by his subordinate, Mr. Fellows (emphasis added):

Any comments you may have **must be submitted within 30 days of the date on which the NOA appears in the Federal Register**, which is expected to be on May 3, 2013.

11. The federal register notice, published May 3, 2013 and listed under the Environmental Protection Agency (EPA), does not clarify this discrepancy. A copy of the federal register notice is incorporated herein as **Attachment 5**.

12. Assuming that the Notice of Availability letter I received from Mr. O’Kane was not uniquely worded for me and that everyone who received a CD of the final areawide EIS received a letter with the same 30-day deadline to submit comments, it is logical to assume the majority of the public interpreted Mr. O’Kane’s statement literally – that public comments were restricted to the stated 30-day period from the date of published notice in the Federal Register. This appears to be a deliberate effort to deter the public from submitting comprehensive comments on this final areawide EIS and to ensure only the most cursory comments possible are received.

13. **Resolution of Conflicting Corps Statements – To resolve conflicting statements by the Corps regarding the deadline for public comments the NOA should be re-advertised in the Federal Register clearly providing a minimum of 60 days from the date of NOA publication in the Federal Register and the Corps should send new letters to everyone who submitted comments previously, confirming the extended comment period.**

14. **New Information/Additional Sinkholes Associated with Fractures Linked to Mines –** My supplemental comments submitted to the Corps on March 13, 2013 related to the three EIS projects referenced above, included new information and supplemental comments describing the new sinkholes associated with fractures extending to and through phosphate mines in central Florida that the Corps allegedly evaluated in the areawide EIS. These new sinkholes included a lethal sinkhole that killed a man while he was sleeping in his bedroom after the sinkhole opened under his home. Since that supplemental comment letter with that new information, three additional sinkholes opened in that same vicinity. Those sinkholes also are associated with fractures extending to and through phosphate mines in central Florida that the Corps allegedly evaluated in the areawide EIS.

15. I contacted the Florida Geological Survey (FGS) to obtain the exact coordinates of the three new sinkholes that opened in the same vicinity as the lethal sinkhole and second sinkhole described in my comment letter dated March 13, 2013. The following coordinates were provided to me by FGS for the three new sinkholes that opened in the vicinity of the lethal sinkhole in Seffner:

Latitude: 27.97771, Longitude: -82.26261

Latitude: 27.99352, Longitude: -82.29674

Latitude: 27.99033, Longitude: -82.29566

16. I prepared three maps to display these new sinkholes in proximity to previously mapped fractures and the previous two sinkholes in Seffner that were not included in the areawide EIS, as well as the sinkholes previously mapped in the sinkhole data base and included in the areawide EIS. I used the same approach to prepare my new maps as described in my comment letter dated March 13, 2013 and in the peer-reviewed publication dated 2012 by Lines et al. that I submitted previously to the Corps as supplemental comments for the three EIS projects referenced above. **Attachment 6**, incorporated herein, includes those three maps, which are labeled A, B and C.

17. Map A is an enlargement of the area in Hillsborough County where the five recent, new sinkholes opened. These five new sinkholes are shown as yellow circles numbered 1 through 5, in the order in which these sinkholes opened and the previously mapped sinkholes, which are included in the EIS, are shown in blue. Sinkholes 3 through 5 are the three recent sinkholes that opened after my supplemental comment letter dated March 13, 2013. The fractures, previously mapped for the FGS and published by Vernon in 1951 are shown as yellow diagonal lines in maps A through C and the extensive network of fractures previously mapped by the Remote Sensing Section of Florida Department of Transportation (FDOT) in 1973 are shown as red diagonal lines.

18. The yellow circle number 1 in Map A is the location of the sinkhole that resulted in the death of Mr. Jeffrey Bush. The lethal sinkhole is located on one of the fractures near the intersection with a second fracture and that intersection that a previously mapped sinkhole is located at the point where the two fractures intersect. The fracture that resulted in the death of Mr. Bush also extends beyond Map A, into and through the area of the phosphate mines allegedly evaluated in this areawide EIS. Photographs of that sinkhole, reportedly 60-feet deep, and the destruction it cause to homes and surroundings are provided at the following USA Today link:

<http://www.usatoday.com/story/news/nation/2013/03/04/sinkhole-home-florida/1961997/>

19. Recent sinkholes 2, 4 and 5 are located in a linear pattern that includes a previously mapped sinkhole (shown in blue) and parallels another fracture near the lethal sinkhole. The linear alignment of these four sinkholes suggests the presence of another underlying fracture that was not mapped by Vernon or FDOT. These four sinkholes also are located in the immediate proximity of the apparent intersection of two fractures mapped by FDOT. The third recent sinkhole is aligned with a previously mapped sinkhole (shown in blue) and those two sinkholes are in line with the northwest trajectory of the fracture mapped by Vernon (shown in yellow).

20. Map B includes a smaller-scale version of the area shown in Map A, showing the proximity of the five recent sinkholes to one cluster of phosphate mines to the southeast. The smaller white square shows the area of the five recent sinkholes. The larger white square shows the area of some of the active and inactive phosphate mines allegedly evaluated in this areawide EIS. The boundaries of Hillsborough, Polk, Manatee, Hardee, Highlands and Osceola Counties are shown in black in Map B. Although not shown in Map B, the fractures extend to the coastline of the coastal counties. Therefore, diversion of groundwater previously flowing to estuaries and other sensitive coastal areas could have occurred already as a result of groundwater alterations and specifically groundwater depletions caused by active and inactive phosphate mines.

21. Map C is an enlargement of Map B in the location of the cluster of active and inactive phosphate mines. This area also includes a dense network of fractures that extend for many miles (kilometers) beyond the boundaries of those mines, north, east, south and west, including the fractures extending to and through the area of the recent sinkholes.

22. **Failure to Consider or Even Include my Comments and Supporting Documents in EIS** – Despite the fact that I submitted new information about the lethal sinkhole and second recent sinkhole associated with previously mapped fractures as supplemental comments more than a month before the date on Mr. O’Kane’s “Notice of Availability” referenced above and published NOA in the Federal Register, the Corps neither included my comment letter in the final areawide EIS, nor delayed the release of the final areawide EIS to address these serious cumulative adverse impacts of phosphate mining in central Florida. In fact, that final EIS included **no** mention of those sinkholes, or fractures, or the death and extensive property destruction that resulted from those sinkholes, which extended to and through the phosphate mines allegedly evaluated in the Corps’ areawide EIS.

23. **Failure to Include Sinkhole and Fracture in Glossary** - Additionally, “Chapter 10 Glossary of the final areawide EIS does not even include or define the terms “sinkhole” or “fracture.” This serious omission implies that sinkholes and fractures are not critical factors in the analysis of the secondary and cumulative adverse impacts of phosphate mining, when in fact they are driving forces of secondary and cumulative adverse impacts.

24. **Failure to Include Table of Contents or Index for Public Comments** - Equally problematic, the final areawide EIS by the Corps does not include a table of contents for the written comments submitted to that agency for this EIS and those written comments were included in a non-searchable format. Therefore, it is extremely difficult for the public and nearly impossible for people with vision impairments to confirm that copies of all of the written comments submitted for the areawide EIS actually were included in the areawide EIS, much less locate specific written comments that were submitted.

25. The Corps’ failure to include a searchable option for locating copies of the actual comment letters included in the final areawide EIS prevented me from confirming that Chapter Appendix A: Public Comments included a copy of my comment letter dated February 27, 2012 and the supporting documents that accompanied that comment letter, or the other supporting documents that I submitted, such as the peer-reviewed scientific publication by Lines et al., 2012, or the supporting documents that Dr. Demers submitted, such as the 2007 peer-reviewed publication by Bacchus. Regardless of the inability to search for the locations of the actual comment letters and other written comments submitted for the areawide EIS, the failure of the final areawide EIS to address my comments in the “Comment and Response Table” suggests that my comments and supporting documents were not included, despite the fact that I have confirmation that my comment letter and documents were received. A copy of my comment letter dated February 27, 2012 is incorporated herein as **Attachment 7**. The attachments to that comment letter included a copy of my CV and four peer-reviewed, scientific publications by USGS, 1999, Bacchus, 2006, Bacchus, 2007, and Bacchus et al., 2011, which I will resubmit if the Corps contacts me claiming that they did not received those documents.

26. **Critical Information Related to Sinkholes and Fractures Excluded from EIS** - Although the final areawide EIS acknowledges the fact that mining and lowered water levels due to groundwater pumping is a “triggering mechanism for sinkhole collapse” (p. 4-289), it fails to acknowledge the well-documented fact in myriad peer-reviewed scientific publications that sinkholes are associated with fractures and that preferential flow occurs through fractures. The final areawide EIS also fails to acknowledge that the adverse impacts of both mining and mining-related groundwater pumping can extend for many miles beyond a mine site, including to coastal waters, due to preferential groundwater flow through fractures.

27. These facts, related to sinkholes and fractures, and the fact that fractures are one of the characteristics of karst aquifer systems were documented clearly in peer-reviewed scientific publications that were submitted to the Corps during the public comment period for the draft areawide EIS, such as the peer-reviewed scientific publications referenced above. The failure of the final areawide EIS to evaluate the direct, secondary and cumulative impacts of existing and proposed mining via preferential flow through fractures renders the statement on page 4-289 of the final areawide EIS without any scientific basis, “Based on the groundwater effects modeling done for the Final AEIS, there will be no cumulative effects from the four current actions and the two reasonably foreseeable actions on springs or sinkholes.” Even other public comments emphasized the specific importance of evaluating the influence of karst features, such as fractures. For example, the first sentence of the public comment letter on pdf page 150 of the Chapter 14 Appendix A: Public Comments in the Corps’ final areawide EIS states (emphasis added):

The research by Bacchus et al. 2011 regarding **the effect of mining on groundwater and wetlands**, hydrologically connected **because of karst**, should be addressed by the AEIS.

28. The incomplete summary of public comments provided in the Chapter 14 Appendix A: Public Comments of the Corps’ areawide EIS, beginning on pdf page 817, also included evidence that my documents had been removed from the EIS files. One example is on pdf page 1351 of the “Response to Comment” and includes the following statement:

Several submitted documents appear to be missing from the Corps files...Non-mechanical Dewatering of Florida Aquifer, Dr. Sydney Bacchus, Geological Society of America (2006). “

29. **Influence of Applicants on Content of EIS and Record** - The removal of my comment letters, peer-reviewed publications and other supporting documents and the complete failure of the final areawide EIS to address fractures and my other comments appear to be the direct result of comments by the applicants. The first example is included in the “CF Comments Table included on pdf page 638 of the final areawide EIS. That comment states, without providing any basis of support:

Bacchus is not a credible source that should be referenced in the DAEIS.

30. A second example is found in Mosaic’s comments on pdf page 1430 of Chapter 14 Appendix A. That comment states, in relevant part:

As described more fully in Kiefer et al (2011), many of the conclusions in the Bacchus et al (2011) presentation are not considered to be correct.”

31. In fact, “Bacchus et al (2011)” is not a “presentation.” It is a scientific paper that went through more than a year of extensive peer-review by hydrologists and geologists, and subsequently was published in the Environmental and Engineering Geoscience journal.

32. The list of references in Chapter 7 of the final areawide EIS does not include any reference to Kiefer et al (2011), but an extensive search of published scientific literature revealed no publications for Kiefer et al., in 2011. In fact, it would have been virtually impossible for “Kiefer et al” to have published a peer-reviewed description of the 2011 Bacchus et al. paper in a reputable scientific journal in the same year that my paper was published because of the extensive time required for the peer-review process.

33. **Proof of Lowered Water Levels and Supporting Documents also Excluded from EIS** – In addition to failing to include any discussion of the presence and critical role of fractures in the final areawide EIS, the EIS also fails to include any of the peer-reviewed scientific publications that Dr. Demers and I submitted as supporting documents in the list of references for the final areawide EIS (Chapter 7).

34. Equally egregious was the fact that the final areawide EIS failed to include or consider the additional comments and documents provided by Norma Killebrew in her sworn affidavit dated March 28, 2013. Her affidavit included supporting documents from the Southwest Florida Water Management District (SWFWMD) documenting that Mosaic’s mining already has resulted in irreversible lowering of the

water levels in proximity to her family's ranch, in addition to long-term documentation of countless permit violations by Mosaic, Ms. Killebrew's affidavit and supporting documents from the SWFWMD alone should be sufficient to show that the existing mines already have resulted in irreversible secondary and cumulative impacts to the aquifer system. In fact, the SWFWMD documentation that the lowered water levels cannot support the preserved/mitigation wetlands is sufficient to conclude that there is no justification for the Corps to consider four individual mining projects, as Mr. Fellows' following statement suggests the Corps will do in his email dated May 29, 2013 (**Attachment 4**):

Finally, as described in Chapter 5 of the Final AEIS there will be an opportunity to provide comments on the four individual projects when we publish the results of the Section 404(b)(1) and public interest reviews for public review and comment. These public notices will include the results of the mitigation sequencing - avoidance, minimization, and compensatory mitigation of impacts to waters of the United States.

35. **Partial Supplemental Comments and New Information on EIS** – My supplemental comments and new information included in this affidavit apply to all three of the EIS projects referenced above. Although the supplemental comments and new information included in this affidavit do not represent my final comments on the final areawide EIS or other EIS projects referenced above, I believe these comments and the referenced information that the Corps excluded from the final areawide EIS are sufficient to conclude that such extensive irreversible secondary and cumulative adverse impacts have occurred from existing mining that no additional mining can be allowed and that the four pending mine applications should be denied.

36. **Resolution of Excluded Comments and Support Documents** – To resolve the problem of the Corps excluding information, including supporting documents, referenced above that is critical to the public review and comment process, the Corps should initiate a Supplemental Areawide EIS.

FURTHER AFFIANT SAYETH NAUGHT.

Under penalty of perjury, I certify that the above statements are true and correct.  
Executed on this 30<sup>th</sup> day of May 2013 in Athens, Georgia.



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Sydney T. Bacchus, Ph. D.  
Applied Environmental Services, LLC  
P.O. Box 174  
Athens, GA 30603



June 3, 2013

John Fellows, Project Manager, areawide expansion of phosphate mining  
U. S. Department of the Army Corps of Engineers (Corps)  
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Gordon A. Hambrick III, Senior Project Manager, LNP  
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U. S. Department of the Army Corps of Engineers  
Regulatory Division  
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Re: Supplemental comments and new information for EIS review of proposed areawide increase in phosphate mining, Levy Nuclear Plant (LNP) and Tarmac (aka "King Road") Mine

Dear Project Managers:

On May 31, 2013 I provided the comments by Dr. Sydney Bacchus on the proposed projects referenced above as a sworn affidavit. Attachments to this letter include supplemental comments by Dr. Bacchus and comments by Norma Killebrew, an Ecology Party member. Both attachments are sworn affidavits and are included in the pdf file with this cover letter. The 11 attachments referenced in Dr. Bacchus's sworn affidavit are provided as separate pdf files. Please confirm that you have received all of the documents that I am transmitting to you electronically.

Dr. Bacchus's comments describe how the proposed mining projects in the final areawide EIS will result in adverse impacts to the area where the LNP and Tarmac projects are proposed. Ms. Killebrew's comments describe how she was not notified of the availability of the final areawide EIS or provided with a compact disc copy of that EIS. A second request is made for a supplemental areawide EIS for the additional 4 proposed phosphate mines in central Florida.

Sincerely,



Cara L. Campbell, Chair  
chair@ecologyparty.org

Attachments

cc:

Lt. General Robert Van Antwerp, Chief (hq-publicaffairs@usace.army.mil)  
Cindy Dohner, US Fish & Wildlife Service Region 4 Director (Cynthia\_Dohner@fws.gov)  
Gwendolyn Keys Fleming, USEPA Region 4 Administrator (Beverly.Brenda@epa.gov)  
Heinz Mueller, USEPA Region 4 Chief, NEPA Program Office (Mueller.Heinz@epa.gov)  
Arturo E. Torres, Chief Hydrologic Investigations Section, Tampa USGS (aetorres@usgs.gov)  
Miles M. Croom, NOAA Asst. Regional Admin. Habitat Conservation Div. (Miles.Croom@noaa.gov)  
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Jaclyn Lopez, Center for Biological Diversity (jlopez@biologicaldiversity.org)  
Glenn Compton, ManaSota-88 (ManaSota88@comcast.net)  
Dr. Sydney Bacchus (appliedenvirserve@gmail.com)  
Dr. Nora Demers (roynora@comcast.net)  
Norma Killebrew (Tiff313@aol.com)  
John Rehill, Bradenton Times (john.rehill@thebradentontimes.com)

641 SW 6th Avenue, Fort. Lauderdale, FL 33315 (954) 525-4522

**DECLARATION OF NORMA KILLEBREW  
SUPPLEMENTAL COMMENTS  
RELEVANT TO THE  
UNITED STATES ARMY CORPS OF ENGINEERS'  
ENVIRONMENTAL IMPACT STATEMENTS  
FOR  
AREAWIDE PHOSPHATE MINING  
AND PROPOSED  
PROGRESS ENERGY FLORIDA, INC.  
LEVY COUNTY NUCLEAR POWER PLANT UNITS 1 AND 2  
AND TARMAC MINE IN FLORIDA**

I, Norma Killebrew, declare as follows:

1. My name is Norma Killebrew. I am more than eighteen years of age and am competent to make this Declaration based on personal knowledge and experience.
2. I did not receive a compact disc (CD) copy of the final areawide Environmental Impact Statement (EIS) for phosphate mining in central Florida or a copy of the Notice of Availability letter that the U.S. Army Corps of Engineers (Corps) provided to other members of the public who had submitted comments previously regarding the proposed increase in phosphate mining in central Florida. I have provided live comments and written comments on the proposed increases in phosphate mining in central Florida repeatedly since the scoping process for the areawide EIS began.
3. I accidentally learned about the Corps' release of the final areawide EIS from another concerned citizen in my area who received a copy of the CD and Notice of Availability letter in the mail approximately a month ago. Their Notice of Availability letter stated that comments must be submitted within 30 days of the date the notice was published in the federal register. That date was March 3, 2013. That means that the deadline for comments on the final areawide EIS is June 3, 2013.
4. I have not been able to get an online copy of the final areawide EIS because my internet has been down.
5. That amount of time is way too short for the public to provide comments on an areawide EIS that is supposed to be covering four new mines and evaluating all of the impacts of all of the existing mines. I have also had a death in my immediate family. The Corps' failure to notify me about the public, the ridiculously short comment period and the death in my family have prevented me from providing comments at this time.
6. I am requesting that the Corps grant a time extension of at least 60 days for public comment and that all of the concerned members of the public receive a written notice in the mail of this time extension to submit written comments to the Corps on the final areawide EIS.

FURTHER AFFIANT SAYETH NAUGHT.

Under penalty of perjury, I certify that the above statements are true and correct.  
Executed on this 3<sup>rd</sup> day of June 2013 in Hillsborough County, Florida

*Norma Killebrew*

---

Norma Killebrew

**DECLARATION OF SYDNEY T. BACCHUS  
REGARDING ADDITIONAL NEW INFORMATION AND SUPPLEMENTAL COMMENTS  
RELEVANT TO THE  
UNITED STATES ARMY CORPS OF ENGINEERS'  
ENVIRONMENTAL IMPACT STATEMENTS  
FOR  
AREAWIDE PHOSPHATE MINING  
AND PROPOSED  
PROGRESS ENERGY FLORIDA, INC.  
LEVY COUNTY NUCLEAR POWER PLANT UNITS 1 AND 2  
AND TARMAC MINE IN FLORIDA**

I, Sydney T. Bacchus, declare as follows:

1. My name is Sydney T. Bacchus. I am more than eighteen years of age and am competent to make this Declaration based on personal knowledge and experience.

2. **My Expertise** - I hold a doctoral degree from the University of Georgia in the multidisciplinary field of hydroecology. My educational and professional background and experience and peer-reviewed scientific publications are provided in my curriculum vitae, which was provided to the Corps on May 31, 2013 in my sworn affidavit dated May 30, 2013, for the three projects referenced above.

3. **My Previous Comments** - The United States Army Corps of Engineers (Corps) conducted segmented Environmental Impact Statements (EIS) for: (a) the areawide phosphate mining; (b) the proposed Progress Energy Florida, Inc. (PEF) Levy County Nuclear Power Plant Units 1 and 2 (LNP); and (c) the proposed Tarmac mine – all located within the Southwest Florida Water Management District (SWFWMD) and the regional, karst Floridan aquifer system. I have provided extensive comments, exhibits and attachments to the Corps on all of those EIS documents. My most recent comments on those three segmented EIS documents were provided in a sworn affidavit dated May 30, 2013 and were submitted to the Corps by the Ecology Party of Florida (Ecology Party) on May 31, 2013, for the EIS documents of the three projects referenced above. Those comments addressed inadequacies of the areawide EIS related to the following topics:

Notice of Availability Letter

30-Day Comment Period

New Information/Additional Sinkholes Associated with Fractures Linked to Mines

Failure to Consider or Even Include my Comments and Supporting Documents in EIS

Failure to Include Sinkhole and Fracture in Glossary

Failure to Include Table of Contents or Index for Public Comments

Critical Information Related to Sinkholes and Fractures Excluded from EIS

Influence of Applicants on Content of EIS and Record

Proof of Lowered Water Levels and Supporting Documents also Excluded from EIS

4. **Segmentation and Arbitrary Restriction of Study Area/Affected Environment Due to Failure to Consider Impacts to Floridan Aquifer System** – The sworn affidavit dated March 28, 2013, submitted to the Corps by Norma Killebrew for the EIS projects referenced above, was not included or considered in the final areawide EIS despite the fact it provided proof that current phosphate mining by Mosaic in the “study area” already has resulted in irreversible lowering of the aquifer level. Page 5 of the 2005 USGS publication by Katz and Raabe addressed the “proposals for diverting water from the Suwannee River to help satisfy the domestic water needs of the greater Tampa metropolitan area” and the “effects of such withdrawals on riverine or estuarine habitats and fauna.” The proposed LNP and Tarmac

mine projects also would reduce water in the same aquifer system that contributes to the Suwannee River from which it has been proposed water be diverted to the greater Tampa metropolitan area, but the Corps arbitrarily segmented those projects rather than including all three of the EIS projects referenced above in the same “study area” and “affected environment.” A copy of that USGS publication is incorporated herein as **Attachment 1**.

5. The phosphate mining industry’s use of hundreds of millions of gallons of groundwater per day in central Florida from the same Floridan aquifer system that was the sole source of municipal water for the greater Tampa metropolitan area was one of the primary factors in forcing municipal water suppliers to switch to alternative sources that are far more expensive and unreliable than the original groundwater source. A copy of the September 8, 2011 publication by the Bradenton Times describing that process of shifting the costs to the public while the mining industry continues to extract groundwater without compensation to the public for depleting potable water in the Floridan aquifer system is incorporated herein as **Attachment 2**.

6. Figure 3-5 of the final areawide EIS depicts a cross section of the Floridan aquifer system in the “AEIS Study Area.” Although the “Study Area” is not defined in the Glossary in the final areawide EIS, that Glossary defines “Affected Environment” on page 10-1 as, “The environment of the study area that could be affected by the alternative under consideration.” By using this circular definition the Corps artificially narrowed the scope of the areawide EIS such that the Corps can ignore any impacts to the environment outside the boundary of the study area. This is unacceptable. “Section 3.3.2 Water Resources” on pdf page 22 of Chapter 3 of the final areawide EIS states, “Water Resources in the AEIS study area are a critical element of the natural systems that could be impacted by phosphate mining. These resources fall into two major categories: surface waters and groundwater.”

7. The boundaries and hence the scope of both the undefined “study area” and the “affected environment” for the areawide EIS have been restricted arbitrarily. Those boundaries should have been expanded at least enough to include adverse impacts to the entire Floridan aquifer system from all of the phosphate mining that has occurred or is proposed in Florida, because all of that mining is adversely affecting the Floridan aquifer system. Those more realistic boundaries would have addressed the significant adverse environmental impacts to the Suwannee River from the drastic reductions of groundwater discharges directly and through springs, as well as impacts to the coastal environment because of these reduced freshwater discharges.

8. Widening this narrow scope of the “study area” and “affected environment” to encompass other proposed adverse impacts to the Floridan aquifer system, including the proposed LNP and Tarmac projects referenced above also is justified because those projects would result in secondary and cumulative adverse impacts to the Floridan aquifer system. Therefore, the fact that the Corps has segmented the evaluation of these three proposed projects into three separate EIS also is arbitrary.

9. **Arbitrary Restriction of Study Area/Affected Environment Due to Failure to Consider Adverse Secondary and Cumulative Impacts to Water Quality** - Based on the Corps own definition of the “Affected Environment” in the Glossary, referenced above, neither the study area, nor the affected environment can be restricted to the small area addressed by the final areawide EIS because the area of “affected environment” extends to areas throughout the United States, as described in previous written comments that both Dr. Demers and I submitted. For example, the extensive dead zone in the Gulf of Mexico from Texas to Florida is a well-established adverse impact of fertilizers from phosphate mines.

10. The eutrophication from mined phosphate converted into fertilizers is not restricted to the use of those fertilizers for farming, which is the cause of the extensive dead zone in the Gulf of Mexico. These same commercial fertilizers also are dumped on lawns and golf courses throughout the United States.

The June 1, 2013 article by Matthew Levin, incorporated herein as **Attachment 3**, describes the increasing number of restrictions that local municipalities have been forced to enact because of the environmental damage of fertilizers applied to lawns far beyond the arbitrarily restricted boundaries of the “study area” and the “affected environment” established in the final areawide EIS. That article states, “To diminish the runoff, more than 50 local governments have enacted more stringent limitations on lawn fertilizer use.” Note that the Treasure Coast, which includes Martin County, Florida, is on the east coast of Florida, many miles beyond the arbitrary boundary of the “study area” and the “affected environment” established in the final areawide EIS. The final areawide EIS failed to address the adverse secondary and cumulative environmental impacts from fertilizer made from phosphate mining and used to fertilize lawns and golf courses. That final EIS also failed to consider the reduced market for the four applicant’s fertilizers as restrictions on the use of these fertilizers increase, due to these types of adverse environmental impacts.

11. The adverse secondary and cumulative environmental impacts to water quality from phosphate mining that have been excluded from the final areawide EIS are not restricted to eutrophication. The 2008 peer-reviewed publication in the journal *Nature*, by Rohr et al. 2008, incorporated herein as **Attachment 4**, measured more than 240 plausible predictors of amphibian trematode (internal parasites) infections and concluded that the two most likely causes of these parasitic infections were the herbicide atrazine and phosphate from fertilizers. This increase in parasite infections, caused in part from phosphate mined for fertilizers, have resulted in significant decline in the abundance of these amphibians, which are a key link in the food chain for wildlife. The final areawide EIS failed to address these adverse secondary and cumulative environmental impacts from fertilizer made from phosphate mining. Because of the importance of this finding, in a study conducted on an area affected by fertilizer applications approximately half a continent away from the arbitrarily restricted “study area” and “affected environment” established in the final areawide EIS, the journal included for following Editor's Summary, published at <http://www.nature.com/nature/journal/v455/n7217/edsumm/e081030-12.html> (emphasis added):

Editor's Summary

30 October 2008

Disappearing amphibians: agrochemicals implicated

Declining amphibian populations have been reported in the past twenty years from locations all over the world. These events have been attributed variously — often without much evidence — to habitat loss, climate change and disease. Now a case study of the northern leopard frog, *Rana pipiens*, in wetlands across Minnesota points to the use of agrochemicals — combined with parasitic infestation — as a contributor to population decline. The study sought factors associated with the abundance of larval trematodes in the frogs. An abundance of these parasites can be debilitating, causing limb malformation, kidney damage and death. **Of more than 240 plausible predictors of trematode infection — ranging from the presence of various plant and animal species to agrochemicals and habitat geography — two stood out: the herbicide atrazine and the fertilizer, phosphate.** Atrazine and phosphate are principal agrochemicals for corn and sorghum production, and together they accounted for 74% of the variation in trematode abundance.

Letter: Agrochemicals increase trematode infections in a declining amphibian species

Jason R. Rohr, Anna M. Schotthoefer, Thomas R. Raffel, Hunter J. Carrick, Neal Halstead, Jason T. Hoverman, Catherine M. Johnson, Lucinda B. Johnson, Camilla Lieske, Marvin D. Piwoni, Patrick K. Schoff & Val R. Beasley

doi:10.1038/nature07281

12. **Hazardous Mining Waste Dumped in Municipal Water Supplies Not Considered** – Athens-Clarke County (ACC), Georgia, where I live and drink tap water, spends \$55,000 a year to dump hazardous mining waste from Mosaic into our municipal water supply under the guise of “fluoridation.” Unlike pharmaceutical-grade fluoride, this industrial-grade fluoride (hydrofluorosilicic acid) is contaminated with arsenic. Mosaic’s mine waste also is the source of “fluoridation” for many of Florida’s municipalities that have fluoridated tap water. The 2013 peer-reviewed scientific publication by Hirzy et al., incorporated herein as **Attachment 5**, describes the extensive adverse health impacts to the public that occur from consumption of municipal water contaminated with industrial grade fluoride that Mosaic and other phosphate mining companies previously disposed of as hazardous mining waste. These contaminants not only enter the body when the water is consumed, they are absorbed through the skin when people bathe and shower in municipal water contaminated with industrial-grade fluoride. Although my municipality provides monthly test results of fluoride concentrations as one contaminant routinely tested in my municipal water, my community does not include test results for arsenic concentrations in my tap water. Today I received the results from a certified laboratory confirming that two samples of composted sewage sludge that I collected from the same pile where that “compost” was being sold to countless members of the public contained fluoride. I did not have those samples tested for arsenic, because at that time I not aware that arsenic was an additional contaminant of the industrial grade fluoride that was being sold by Mosaic to dump in my municipal water. The fact that fluoride is present in that “composted” sewage sludge means that there is a high probability that the “compost” also is contaminated with arsenic. The final areawide EIS failed to address these adverse secondary and cumulative impacts to humans from drinking and bathing in municipal water that has been contaminated with industrial-grade fluoride and arsenic from Mosaic and other phosphate mining operations.

13. The adverse secondary and cumulative impacts of transferring hazardous mine waste from Mosaic’s phosphate mining sites and designated hazardous waste disposal sites in central Florida to municipalities throughout Florida, Georgia and other states is not restricted to human health impacts. Because those contaminants are dumped in the municipal water supply, that water can contaminate areas watered with municipal water. Surface waters and ground waters also will be contaminated with the transferred industrial grade fluoride and associated arsenic when “waste water” and sewage sludge containing those contaminants are discharged by municipalities throughout Florida, Georgia and other states. The final areawide EIS failed to address these adverse secondary and cumulative impacts to the environment from municipal water that has been contaminated with industrial-grade fluoride and arsenic from Mosaic and other phosphate mining operations.

14. **Failure to Consider Violations of Antidegradation Laws from Cumulative Effects of Reduced Water Quantity and Increased Contaminants** – The failure of the final areawide EIS to address all of the adverse secondary and cumulative environmental impacts related to reductions in water quantity and water quality described above, that result from phosphate mining, results in violations of antidegradation laws beyond the arbitrary boundaries of the “study area” and the “affected environment” established in the final areawide EIS. The final areawide EIS did not consider the violations of antidegradation laws resulting from the secondary and cumulative adverse impacts of existing and proposed phosphate mining in central Florida.

15. Page 3-84 (pdf page 85 of Chapter 3) of the final areawide EIS refers to the “extra protection” afforded to Outstanding Florida Waters (OFW) under the “antidegradation provisions of the rule” and lists the following four as examples: Hillborough River State Park, Little Manatee River State Recreation Area, Lake Manatee State Recreation Area and Paynes Creek State Historic Site. Page 3-87 of

that same chapter of the final areawide EIS includes the following statement, “Fundamental to this process is Florida’s antidegradation policy, which protects existing water quality above the minimum criteria levels and requires that, once uses are achieved, they must be maintained.” In reality, none of those listed areas is “protected” by the antidegradation provisions of the rule, because the state and federal agencies have not considered reductions in water quantity that are known to result in increased concentrations of pollutants even when no new pollutants are discharged. For example, I have personal knowledge of the failure of the state and federal agencies to enforce the antidegradation provisions of the law at Paynes Creek State Historic Site, where the dewatering of the aquifer system from existing mining has been so severe and prolonged that native upland trees (e.g., pine and oak trees) are dying and have died throughout that Historic Site.

16. **CH2MHill’s Inadequate Hydrologic Model and Conflict of Interest**– The editorial published by the Bradenton Times on September 8, 2011 (**Attachment 2**) provides specific examples of multiple clear conflicts of interest of CH2MHill, as the contractor selected by the Corps to conduct the areawide EIS. Despite the fact that multiple clear conflicts of interest of CH2MHill also were addressed in extensive written comments by both Dr. Nora Demers and me, those comments are not included in the Comment and Response Tables of the final areawide EIS, that begins on pdf page 817 of Appendix A – Public Comments. The following response is included on pdf page 1352 to comments about conflicts of interest from another member of the public:

The Corps regularly participated in the preparation of the document, independently evaluated the information in the document to ensure that it was technically adequate and not biased, had the final determination whether the data provided is adequate and accurate, and takes full responsibility for the scope and contents of the AEIS.

17. The conflict of interest is not confined merely to the information **in** the document. Of equal or greater concern is the information **omitted from** the document. Notable examples include the total exclusion in the final areawide EIS of any reference to the dense network of fractures that extend throughout the arbitrarily constrained and undefined “study area” and a copy of the actual groundwater model data. The problem associated with these types of critical exclusions is confirmed in the email I received on May 30, 2013 from John Fellows, Project Manager for the areawide EIS, which states, “The groundwater model was prepared by the third-party contractor, CH2M HILL, specifically Jeff Lehnen, Christopher Peters, and Christina McDonough...” Therefore, the claim that the Corps “regularly participated in” the preparation of the groundwater model” as implied in the “Response to Comment” on pdf page 1352 is misleading, at best. A copy of the referenced email that Mr. Fellows sent to me, confirming that the Corps did not prepare the groundwater model is incorporated herein in **Attachment 6**.

18. The same type of model was used by CH2MHill for the groundwater analysis of the EIS for the proposed Levy County Nuclear Power Plant Units 1 and 2 (LNP) referenced above. The presence of fractures was ignored in both models for those EIS projects. Mr. Lehnen is the person who testified on behalf of CH2MHill regarding the model developed for the proposed LNP project. During his sworn testimony for the NRC licensing hearing regarding the proposed LNP on November 1, 2012, Mr. Lehnen testified under oath that although CH2MHill did not collect flow or discharge data from springs in the vicinity, he obtained data on spring flow, or groundwater discharge for the Big and Little King Spring from “The Springs of Florida” publication and included those data in CH2MHill’s groundwater flow model. That publication is available from the Florida Geological Survey (FGS). After I was unable to find any such data for those springs in the publication referenced by Mr. Lehnen, I contacted Mr. Doug Calman, the FGS librarian in charge of the technical library at FGS. Mr. Calman confirmed that there was no such data in that document. The transcripts and errata of that 2012 hearing is incorporated herein as **Attachment 7A-C**. Mr. Lehnen’s testimony in response to the Judge’s question, “Did you do any calibration to evaluate the drain element in conducting this?” is located on page 1415 (pdf page 56) and begins on line 15. A copy of

the email communications that I had with Mr. Calman, with his response dated December 5, 2012 confirming that the data are not included in any edition of the “Springs of Florida,” is incorporated herein as **Attachment 8**. The fact that the final areawide EIS failed to include any model data, and one of the key groundwater modelers involved in CH2MHill’s groundwater models for both of the LNP and areawide EIS projects provided false testimony under oath regarding calibration of that model should be sufficient to conclude that the groundwater model for the areawide EIS is suspect.

19. Regarding the failure of CH2MHill’s model to incorporate and model the influence of fractures on hydrologic impacts from phosphate mining, the Corps cannot claim ignorance regarding the dense network of fractures in its arbitrarily restricted “study area” because at least some of those fractures were identified in the Corps’ 59-page 2004 Draft Technical Memorandum that attempted to analyze those karst features in the “South Florida Region.” Specifically, Figure 1 of that Draft Technical Memorandum is an analog copy of the Florida Department of Transportation (FDOT) map with the fractures shown as red diagonal lines in the three sinkhole/fracture maps that I submitted to the Corps as an attachment to my sworn affidavit dated May 30, 2013. A copy of the Corps’ Draft Technical Memorandum is incorporated herein in **Attachment 9**. My personal communications with the Corps staff over-seeing that project confirmed that the Corps never released a final version of that Technical Memorandum. Although the Corps gave no reason for not releasing the final version, one obvious reason is the ramifications that would have resulted for proposed projects such as the direct, indirect and cumulative impacts of the four new mining projects allegedly evaluated in the areawide EIS referenced above. Yet, the Corps clearly is claiming responsibility only over what is in the areawide EIS, not what was omitted from that document.

20. Additional inadequacies of the model that CH2MHill used to assess groundwater impacts in the segmented, arbitrarily restricted “study area” and “affected area” were described in the July 31, 2012 comment letter submitted by the U.S. Geological Survey (USGS) and included on pdf pages 355-364 of Appendix A of the areawide EIS. I adopt the comments in the USGS’s referenced comment letter at this time.

21. Because the same type of model was used by CH2MHill for both the LNP EIS and the areawide EIS, the prefiled sworn testimony of Dr. Timothy Hazlett regarding the inadequacies of that model for the karst Floridan aquifer system are relevant to the areawide EIS. That prefiled sworn testimony and exhibits are included as **Attachments 10A-E**.

22. **Adverse Environmental Impacts of Altered Natural Hydroperiods Determined by Accurate Model Results** – Because CH2MHill’s hydrologic model for the final areawide EIS failed to incorporate the presence of fractures, preferential flow through the fractures known to occur in the central Florida mining area, and included other described inadequacies, those model results cannot be used to determine the extent or magnitude of hydroperiod alterations. Therefore, the “Ecological Analysis,” adverse impacts to threatened and endangered species, and mitigation determinations made in the final areawide EIS all must be re-evaluated, based on the results of more accurate model results.

23. **Additional Inabilities to Address Mitigation** – The final areawide EIS addresses Mitigation in Chapter 5 and Appendix I. The inadequacies of the model used to determine adverse environmental impacts related to changes in hydroperiod and the arbitrarily restrictive boundaries of the “study area” and “affected environment” are not the only constraints for determining mitigation for the proposed mining. The final areawide EIS failed to consider the new information and evidence provided by Norma Killebrew before release of the final areawide EIS that showed that water levels already had been irreversibly lowered in that mining area to prevent the required hydration for mitigation and preservation wetlands. Therefore, even if the extent and magnitude of the adverse environmental impacts determined in the final areawide EIS were accurate, which they are not, the existing impacts to the aquifer have prevented “mitigation” and compliance with other permit conditions for existing mines. Additionally, although

Chapter 5 includes a single paragraph addressing “Reclamation Variances,” there is no analysis of how the more than 100 variances granted by FDEP for the existing phosphate mines in central Florida have affected mitigation of those mining projects, adjacent and nearby private and public properties, other members of the public, wildlife habitat and threatened and endangered species. Likewise, the Mitigation Chapter also fails to address how the SWFWMD’s failure and inability to enforce mitigation for existing phosphate mines because of irreversible water level declines ensures that proposed mitigation for future mining is not possible, regardless of any “compensatory mitigation performance standards, monitoring requirements, and adaptive management permit conditions” described in Appendix I. of the final areawide EIS.

24. **Adverse Secondary and Cumulative Impacts to Threatened and Endangered Species Not Considered** – Pages 3-141, 3-143 and 3-145 of Chapter 3 of the final areawide EIS provides lists of the endangered and threatened species allegedly included in the “affected environment.” This list is incomplete for several reasons. First, it does not list species under the jurisdiction of the National Marine Fisheries Service (NMFS), despite the July 31, 2012 letter of concern from NMFS included in Appendix A of the final areawide EIS. My discussions with Mark Sramek of NMFS’ Habitat Conservation Division of that office confirmed that the Corps has not initiated consultation with his division or the Protected Resources Division of the NMFS regarding adverse impacts to the habitat or species under his agencies purview. Additionally, these lists fail to include any of the threatened or endangered species in the more scientifically based, enlarged “study area” and “affected environment” described in my comments in the previous paragraphs. For example, the species list included in the June 15, 2012 letter from the Center for Biological Diversity (CBD) that are associated with the Floridan aquifer system also should have been included in the final areawide EIS. A copy of that letter is incorporated herein as **Attachment 11**.

25. **Economic Impacts of Well-Established Adverse Secondary and Cumulative Impacts to Public Not Considered** – Although the term “eutrophication” is included in the Glossary (Chapter 10) of the final areawide EIS, the definition clearly does not include the statement that fertilizer made from the phosphate currently mined and proposed for mining in the arbitrarily limited “study area” is a major cause of eutrophication throughout the United States. Both Dr. Demers and I addressed this problem in previous comments for this areawide EIS. Despite this fact and the overwhelming cost to the public from destruction of resources, including the destruction of our source of seafood from eutrophication due to phosphate fertilizers dispersed throughout our country, these adverse impacts were not considered in the Economic Analysis included in Appendix H of the final areawide EIS.

26. **Ignored Economic Impacts to Public of Alternative Water Sources** – Paragraph 4, above, describes the Corps’s failure to consider one of many adverse secondary and cumulative environmental impacts from phosphate mining in central Florida that extends far beyond the arbitrary boundaries of the “study area” and “affected environment” established in the final areawide EIS, due to groundwater depletion in the vicinity of that mining. That paragraph does not address the economic impacts to the public of that aquifer depletion. The economic impacts analysis of the final areawide EIS, described in Appendix H, also failed to consider the economic impacts incurred by the public of being forced to resort to more expensive and less reliable sources of water than the groundwater originally supplying private residential wells and municipal wells. This economic impact, totaling \$44,530,000 per year, is described in detail by the Bradenton Times in its September 8, 2011 editorial, as the hidden water tax (**Attachment 2**). The calculations for that amount, which contributes to the financial gains of CH2MHill, is described as follows:

If 100 percent of TBW’s daily water supply was from ground water, as it was in the past, and its daily expense for retrieving that water was only \$1.00 per thousand gallons as it is now, it would cost TBW only \$170,000 to retrieve the 170 MGD, and its customers would be saving \$122,000 each day. That’s \$3,672,000 per month, or \$44,530,000 per year.

27. **Economic Impacts to Public of Disposing of Hazardous Mining Waste in Municipal Water Supply Not Considered** – Paragraph 12, above, describes adverse secondary and cumulative environmental impacts related to the existing and proposed phosphate mining in central Florida that occur beyond the arbitrary boundaries of the “study area” and “affected environment” established in the final areawide EIS due to the sale of mine waste containing fluoride for fluoridation of municipal water. The economic impacts analysis of the final areawide EIS, described in Appendix H, also failed to consider the cost of the human impacts of this practice, as described in the 2013 publication by Hirzy et al. (**Attachment 5**).

28. **Failure to Consider Readily Available Alternatives** – The economic analysis included in Appendix H of final areawide EIS also failed to consider the readily available alternatives that I described in previous comments to the Corps. Those alternatives included, but were not limited to, using the proposed mine sites for commercial composting of all food waste in that multi-county area. That alternative would have the additional positive environmental impacts of diverting organic garbage from area dumps and significantly reducing methane production that is released when that type of organic waste is entombed in municipal dumps. Methane is a greenhouse gas that reportedly is 75 times more powerful than CO<sub>2</sub> as a cause of climate disruption. The alternatives I described in previous comments would result in none of the adverse impacts from existing and proposed phosphate mining, while still producing fertilizer.

29. **Resolution of the Corps’ Arbitrarily Restricted “Study Area” and “Affected Environment”** – The Corps could have determined a scientifically based “study area” and “affected environment” for the purpose of analyzing direct, secondary (indirect) and cumulative groundwater impacts by using the boundaries of the Floridan aquifer system. Clearly this analysis must be conducted by a contractor that lacks the clear conflicts of interest exhibited by CH2MHill. The USGS appears to be the most appropriate contractor to conduct the analysis of the “Affected Environment” based on reductions in water quantity.

30. Previous comments and supporting documents have established the fact that the “Affected Environment” of the areawide EIS, based on water quality and economic impacts, extends far beyond the Floridan aquifer system and throughout the United States. The Corps could have and should have obtained additional information from the applicants, Mosaic and CF Industries, to supplement the documents already in the record to determine where fertilizers made from the mining phosphates and mining waste containing fluoride was being purchased and distributed. That combined information would have produced a more scientifically based “affected environment” based on adverse water quality impacts.

31. **Resolution of the Grossly Insufficient Final Areawide EIS** – A supplemental EIS is needed to resolve the problem of the Corps excluding comments and supporting documents, arbitrarily restricting the based “study area” and “affected environment” and failing to consider the secondary and cumulative adverse impacts of the existing and proposed phosphate mining in central Florida.

FURTHER AFFIANT SAYETH NAUGHT.

Under penalty of perjury, I certify that the above statements are true and correct.

Executed on this 3<sup>rd</sup> day of June 2013 in Athens, Georgia.



---

Sydney T. Bacchus, Ph. D.  
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**APPENDIX J**  
**TRANSPORTATION ANALYSIS**



TRANSPORTATION ANALYSIS

TARMAC – LEVY COUNTY

Prepared For

TARMAC AMERICA, LLC

Prepared By

LINCKS & ASSOCIATES, INC.

5023 West Laurel Street

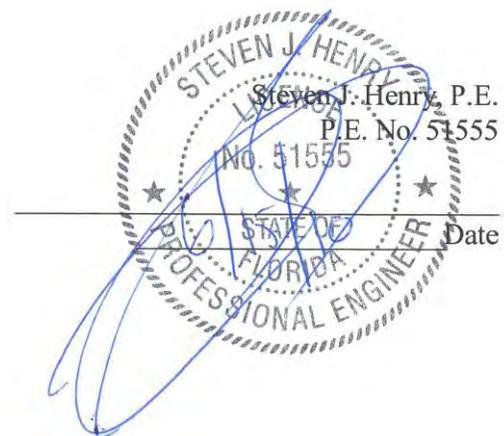
Tampa, Florida 33607

813-289-0039

State of Florida Authorization No. EB0004638

June, 2010

Project No. L09079



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## **INTRODUCTION**

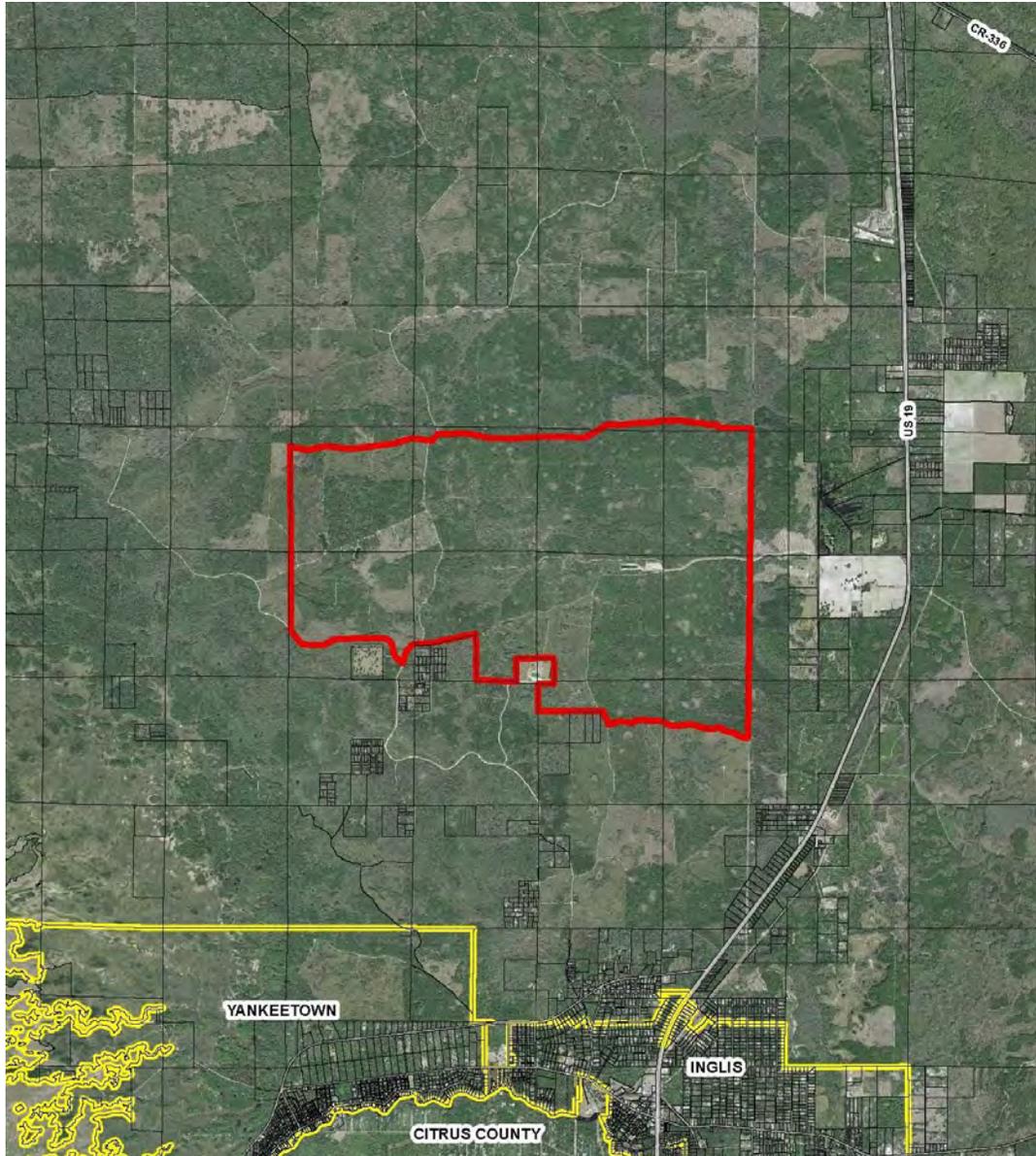
The purpose of this report is to provide a Transportation Analysis in conjunction with the Special Exception application for the proposed Tarmac Limerock Mine. The property is located west of US 19 and approximately five (5) miles north of CR 40 in Levy County, as shown in Figure 1. This analysis will evaluate the impact of the proposed mine on the adjacent roadway network. As requested by Levy County, this analysis will include the following scenarios:

- Existing Conditions
- Peak Construction Year for the Proposed Nuclear Power Plant
- Operational Year for the Proposed Nuclear Power Plant

The following summarizes the methodology and results of the analysis of the project and surrounding roadway system.

## **PROJECT DESCRIPTION**

As previously indicated, Tarmac is proposing a limerock mine located west of US 19 and approximately five (5) miles north of CR 40 in Levy County. The access for the mine will be via King Road.



**Legend**

-  Subject Property
-  Municipal Boundaries

**FIGURE 1**  
**PROJECT LOCATION**

At full operation, there are anticipated to be thirty-five (35) employees and five hundred (500) trucks per day. In addition, it is estimated that there will be approximately three (3) visitors and thirty (30) vendors per day.

King Road is proposed to be improved from US 19 to the mine entrance. Also, turn lanes are proposed to be constructed at the intersection of US 19 and King Road to accommodate the traffic associated with the mine.

#### TRIP GENERATION

According to Tarmac, there are anticipated to be thirty-five (35) employees and five hundred (500) trucks per day at full operation of the mine. In addition, it is estimated that there will be approximately three (3) visitors and thirty (30) vendors per day. The hourly distribution of the truck traffic was estimated based on data provided by Tarmac, for the Pennsuco Limestone Quarry, a limerock mine of similar operation located in Medley, Florida. The hourly distribution of passenger cars was also based on information provided by Tarmac. There are proposed to be two nine (9) hour shifts for the employees, one beginning at 6:30 AM and the second beginning at 10:30 AM.

## PROJECT TRAFFIC

The Institute of Transportation Engineers' (ITE) Trip Generation, 8<sup>th</sup> Edition does not contain trip generation rates for a limerock mine. Therefore, the trip generation for the project was estimated based on data provided by Tarmac. Table 1 summarizes the estimated daily, AM peak hour and M peak hour trip ends for the project. As shown in Table 1, the project is estimated to attract 1,152 daily trip ends. During the AM peak hour, the project is estimated to attract 118 trip ends with 61 inbound and 57 outbound. During the PM peak hour, the project is estimated to attract 64 trip ends with 26 inbound and 38 outbound.

TABLE 1

ESTIMATED PROJECT TRIP ENDS (1)

<u>Type</u>	<u>Number</u>	<u>Daily Trip Ends</u>	<u>AM Peak Hour Trip Ends</u>			<u>PM Peak Hour Trip Ends</u>		
			<u>In</u>	<u>Out</u>	<u>Total</u>	<u>In</u>	<u>Out</u>	<u>Total</u>
Employees	35	86	4	0	4	0	8	8
Trucks	500	1,000	53	53	106	22	26	48
Visitors	3	6	1	1	2	1	1	2
Vendors	30	<u>60</u>	<u>3</u>	<u>3</u>	<u>6</u>	<u>3</u>	<u>3</u>	<u>6</u>
	Total	1,152	61	57	118	26	38	64

(1) Based on data provided by Tarmac.

## STUDY AREA DETERMINATION

According to the application for concurrency evaluation which is referenced in section 50-303 of the Levy County Land Development Code, the study area is defined as follows:

“Projects generating equal to or greater than 200 average daily trips, or projects that will impact more than 5% of the maximum service volume for an impacted road segment, shall provide a traffic study examining all roadway segments wholly or partially within ½ mile of the project entrance/exits, or to the nearest intersecting roadway, whichever is greater.”

As shown in Table 2, the project traffic does not consume 5% of any roadway within five (5) miles of the project entrance. However, at the request of Levy County, Tarmac has agreed to expand the study area to include the following roadways:

- King Road from US 19 to Project
- US 19 from Levy/Citrus County Line to CR 326
- CR 40 from US 19 to Marion County
- SR 121 from US 19 to CR 337
- CR 336 from SR 121 to Marion County

TABLE 2  
STUDY AREA DETERMINATION

<u>Roadway</u>	<u>From</u>	<u>To</u>	<u>Existing Geometry</u>	<u>Period</u>	<u>Adopted LOS</u>	<u>Peak Hour Capacity(1)</u>	<u>Project Traffic</u>	<u>Percent Consumed</u>
US 19	CR 326	SR 121	4LD	AM	B	2,390	5	0.2%
				PM	B	2,390	3	0.1%
US 19	SR 121	Project Access	4 LD	AM	B	2,390	56	2.3%
				PM	B	2,390	29	1.2%
US 19	Project Access	CR 40	4 LD	AM	B	2,390	62	2.6%
				PM	B	2,390	35	1.5%
US 19	CR 40	Citrus County	4LD	AM	B	2,390	61	2.6%
				PM	B	2,390	33	1.4%
CR 40 West	CR 40A	US 19	2 LU	AM	C	1,390	0	0.0%
				PM	C	1,390	0	0.0%
CR 40 East	US 19	Marion Co.	2 LU	AM	C	1,390	1	0.1%
				PM	C	1,390	2	0.1%
SR 121	US 19	CR 337	2LU	AM	C	1,390	33	2.4%
				PM	C	1,390	17	1.2%
CR 336	SR 121	Marion Co.	2LU	AM	C	1,390	18	1.3%
				PM	C	1,390	9	0.6%

(1) FDOT 2009 Quality/Level of Service Handbook.

US 19 - Rural Undeveloped, Uninterrupted Flow Highways, adjusted for truck percentage.

CR 40, SR 121, CR 336 - Cities or Rural Developed Areas, Uninterrupted Flow Arterials, adjusted for truck percentage.

## PROJECT TRAFFIC DISTRIBUTION

The distribution of the project traffic (trucks) is based on a number of factors which are as follows:

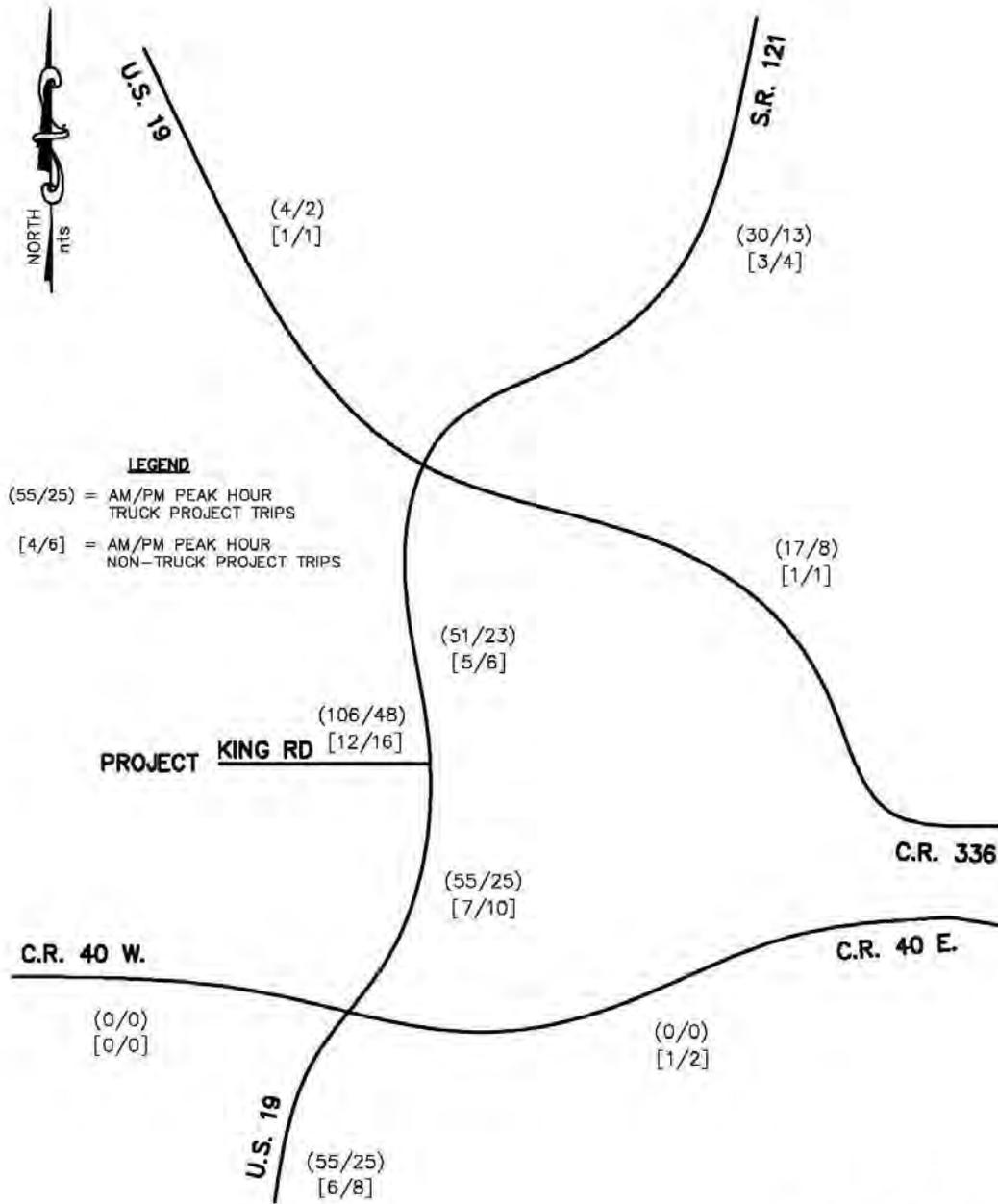
- 1) Market Area – According to Tarmac, the market area for a limerock mine is an approximate 70 mile radius from the facility.
- 2) Distribution within Market Area – This is generally based on the population within the market area. In other words, the higher the population, the higher the demand for aggregate.
- 3) Competition – The number of other mines or sources for aggregate plays a role in the distribution.

Table A-2 in the appendix of the report provides an estimate of the population within the 70 mile radius of the mine.

This population projection provides a general distribution for the demand of limerock. However, within the market area, there are two other significant sources of limerock that affect the distribution. These include the Brooksville mine and Port of Tampa.

One other factor that affects the assignment of the truck traffic is truck routes and/or weight restrictions. In this case, CR 40 has a weight restriction of 10,000 pounds. Therefore, no truck traffic can utilize this facility. In addition, based on a travel time study conducted by Lincks & Associates, Inc., it was determined that CR 336 was a faster travel route than CR 40 for project traffic traveling to and from the east.

Based on the above, Figure 2 provides the distribution of the project traffic within the study area for the project.



**FIGURE 2  
PROJECT TRAFFIC  
DISTRIBUTION**

## BACKGROUND TRAFFIC

As stated previously in this report, this analysis evaluated the existing peak hour condition, the peak construction year for the proposed nuclear power plant (2014) and the operational year of the nuclear power plant (2020). The methodology used to establish the background traffic for each of the above years is described in the following paragraphs.

### Existing Peak Season Traffic

The existing peak season traffic was determined as follows:

- 1) Lincks & Associates, Inc. conducted three (3) day, twenty-four (24) hour machine counts at the following locations the week of December 15, 2009.
  - A. US 19 between CR 326 and SR 121
  - B. US 19 between SR 121 and CR 40
  - C. US 19 between of CR 40 and Citrus County
  - D. CR 40 between of US 19 and Marion County
  - E. SR 121 between US 19 and CR 337
  - F. CR 336 between SR 121 and Marion County
- 2) Since King Road is currently a dirt road, machine counts were not possible. Therefore, AM peak hour and PM peak hour turning movement counts were conducted at the intersection of US 19 and King Road on March 18, 2010.

- 3) The machine counts in number 1 and a turning movement count in number 2, above, were factored to peak season volumes based on the FDOT Seasonal Adjustment factors.

Table 3 provides the existing season traffic.

#### Year 2014 Traffic

The year 2014 peak hour volumes were calculated as follows:

- 1) Lincks & Associates, Inc. conducted three (3) day, twenty-four (24) hour machine counts at the following locations the week of December 15, 2009.
  - A. US 19 between CR 326 and SR 121
  - B. US 19 between SR 121 and CR 40
  - C. US 19 between of CR 40 and Citrus County
  - D. CR 40 between of US 19 and Marion County
  - E. SR 121 between US 19 and CR 337
  - F. CR 336 between SR 121 and Marion County
- 2) Since King Road is currently a dirt road, machine counts were not possible. Therefore, an AM peak hour and PM peak hour turning movement counts were conducted at the intersection of US 19 and King Road on March 18, 2010.

TABLE 3

PEAK HOUR PEAK SEASON BACKGROUND TRAFFIC

Roadway	From	To	Project	Period	2009 Peak Hour Peak Season Traffic (1)			Growth Rate (2)	2014 Peak Hour Peak Season Traffic			2020 Peak Hour Peak Season Traffic		
					NB/EB	SB/WB	Total		NB/EB	SB/WB	Total	NB/EB	SB/WB	Total
King Rd.	US 19	Project		AM	0	0	0	3.0%/Year	0	0	0	0	0	0
				PM	5	1	6	3.0%/Year	6	1	7	7	1	8
US 19	CR 326	SR 121		AM	119	87	206	3.0%/Year	137	100	237	158	116	274
				PM	149	158	307	3.0%/Year	171	182	353	198	210	408
US 19	SR 121	CR 40		AM	174	124	298	3.0%/Year	200	143	343	231	165	396
				PM	213	221	434	3.0%/Year	245	254	499	283	294	577
US 19	CR 40	Citrus Co.		AM	279	258	537	3.0% Year	321	297	618	371	343	714
				PM	451	366	817	3.0% Year	519	421	940	600	487	1087
CR 40	US 19	Marion Co.		AM	140	93	233	3.0%/Year	161	107	268	186	124	310
				PM	139	195	334	3.0%/Year	160	224	384	185	259	444
SR 121	US 19	CR 337		AM	56	66	122	3.0% Year	64	76	140	74	88	162
				PM	75	73	148	3.0% Year	86	84	170	100	97	197
CR 336	SR 121	Marion Co.		AM	19	26	45	3.0% Year	22	30	52	25	35	60
				PM	27	22	49	3.0% Year	31	25	56	36	29	65

(1) See Tables A-3 and A-4 for Peak Season Traffic calculations.

(2) Growth Rate based on 1995 and 2020 as shown in Tables 2 and 2A.

$$\text{US 19 (Station 30)} \quad \left[ \frac{10,584 - 1}{6,048} \right] / 25 = 3.00\%$$

$$\text{CR 38 (Station 152)} \quad \left[ \frac{5,304 - 1}{3,031} \right] / 25 = 3.00\%$$

- 3) The machine counts in number 1 and a turning movement count in number 2, above, were factored to peak season volumes based on the FDOT Seasonal Adjustment factors.
- 4) The growth rates indentified in Tables 2-2A of the Levy County Transportation Element were utilized to factor the existing peak season counts in number 2 and 3, above, to 2014 volumes.

To verify that the growth rates are reasonable, two other sources for growth rates in the area were examined. These include the historical growth rates and forecast growth rates along US 19 and SR 121 in the study area. All of the historical annual growth rates and FDOT forecasted growth rates were determined to be less than 3%. Therefore, the 3% growth rate contained in the Levy County Comprehensive Plan was utilized in this analysis as a worst case condition.

Table 3 provides the 2014 volumes utilized in this analysis.

Year 2020:

The same methodology as utilized to determine the 2014 background traffic was utilized to estimate the year 2020 volume. Table 3 summarizes the year 2020 background traffic volumes.

## LINK ANALYSIS

Tables 4, 5 and 6 provide the peak hour link analysis for existing peak season traffic and the years 2014 and 2020, respectively. As shown in these tables, all segments studied in the vicinity of the project should operate at an acceptable level of service during the AM and PM peak hours with existing peak season traffic, 2014 background plus project traffic and 2020 background plus project traffic.

TABLE 4

EXISTING PEAK HOUR LINK ANALYSIS

Roadway	From	To	Existing Geometry	Period	Adopted LOS	Peak Hour Capacity(1)	2010 Peak Season	LOS
Kings Road	US 19	Project	2LU	AM	C	1,390	0	B
				PM	C	1,390	6	B
US 19	CR 326	SR 121	4LD	AM	B	2,390	206	B
				PM	B	2,390	307	B
US 19	SR 121	Kings Road	4 LD	AM	B	2,390	298	B
				PM	B	2,390	434	B
US 19	Kings Road	CR 40	4 LD	AM	B	2,390	298	B
				PM	B	2,390	434	B
US 19	CR 40	Citrus County	4LD	AM	B	2,390	537	B
				PM	B	2,390	817	B
CR 40	US 19	Marion Co.	2 LU	AM	C	1,390	233	B
				PM	C	1,390	334	B
SR 121	US 19	CR 337	2LU	AM	C	1,390	122	B
				PM	C	1,390	148	B
CR 336	SR 121	Marion Co.	2LU	AM	C	1,390	45	B
				PM	C	1,390	49	B

(1) FDOT 2009 Quality/Level of Service Handbook

US 19 - Rural Undeveloped, Uninterrupted Flow; Highways, adjusted for truck percentage.

CR 40, SR 121, CR 336 - Cities or Rural Developed Areas, Uninterrupted Flow; Arterials, adjusted for truck percentage.

TABLE 5  
YEAR 2014 PEAK HOUR LINK ANALYSIS

Roadway	From	To	Existing Geometry	Period	Adopted LOS	Peak Hour Capacity (1)	2014 Background Traffic	Nuclear Power Plant Traffic	Project Traffic	2014 Total Traffic	LOS
King Road	US 19	Project	2LU	AM	C	1,390	0	0	118	118	B
				PM	C	1,390	7	0	64	71	B
US 19	CR 336	SR 121	4LD	AM	B	2,390	237	335	5	577	B
				PM	B	2,390	353	266	3	622	B
US 19	SR 121	King Road	4LD	AM	B	2,390	343	395	56	794	B
				PM	B	2,390	499	313	29	841	B
US 19	King Road	CR 40	4LD	AM	B	2,390	343	922	62	1,327	B
				PM	B	2,390	499	732	35	1,266	B
US 19	CR 40	Citrus County	4LD	AM	B	2,390	618	658	61	1,337	B
				PM	B	2,390	940	524	33	1,497	B
CR 40 East	US 19	Marion Co.	2LU	AM	C	1,390	268	132	1	401	B
				PM	C	1,390	384	104	2	490	B
SR 121	US 19	CR 337	2LU	AM	C	1,390	140	40	33	213	B
				PM	C	1,390	170	31	17	218	B
CR 336	SR 121	Marion Co.	2LU	AM	C	1,390	52	20	18	90	B
				PM	C	1,390	56	16	9	81	B

(1) FDOT 2009 Quality/Level of Service Handbook.

US 19 - Rural Undeveloped, Uninterrupted Flow Highways, adjusted for truck percentage.

CR 40, SR 121, CR 336 - Cities or Rural Developed Areas, Uninterrupted Flow Arterials, adjusted for truck percentage.

TABLE 6

YEAR 2020 PEAK HOUR LINK ANALYSIS

Roadway	From	To	Existing Geometry	Period	Adopted LOS	Peak Hour Capacity (1)	2020 Background Traffic	Nuclear Power Plant Traffic	Project Traffic	2020 Total Traffic	LOS
King Road	US 19	Project	2LU	AM	C	1,390	0	0	118	118	B
				PM	C	1,390	8	0	64	72	B
US 19	CR 336	SR 121	4LD	AM	B	2,390	274	168	5	447	B
				PM	B	2,390	408	137	3	548	B
US 19	SR 121	King Road	4LD	AM	B	2,390	396	198	56	650	B
				PM	B	2,390	577	161	29	767	B
US 19	King Road	CR 40	4LD	AM	B	2,390	396	462	62	920	B
				PM	B	2,390	577	374	35	986	B
US 19	CR 40	Citrus County	4LD	AM	B	2,390	714	330	61	1,105	B
				PM	B	2,390	1,087	266	33	1,386	B
CR 40 East	US 19	Martin Co.	2LU	AM	C	1,390	310	66	1	377	B
				PM	C	1,390	444	54	2	500	B
SR 121	US 19	CR 337	2LU	AM	C	1,390	162	20	33	215	B
				PM	C	1,390	197	16	17	230	B
CR 336	SR 121	Martin Co.	2LU	AM	C	1,390	60	10	18	88	B
				PM	C	1,390	65	8	9	82	B

(1) FDOT 2009 Quality/Level of Service Handbook.

US 19 - Rural Undeveloped, Uninterrupted Flow Highways, adjusted for truck percentage.

CR 40, SR 121, CR 336 - Cities or Rural Developed Areas, Uninterrupted Flow Arterials, adjusted for truck percentage.

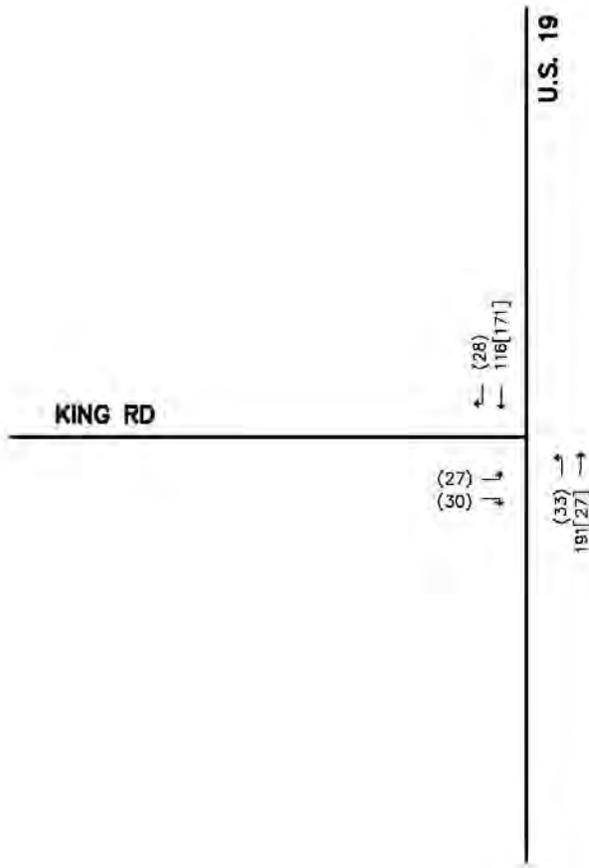
## ACCESS RECOMMENDATIONS

The recommendations included in this report are based on a field review of the site, the proposed site plan and the Transportation Analysis. Figure 3 illustrates the AM peak hour turning movement volumes and Figure 4 illustrates the PM peak hour turning movement volumes for the year 2020 with background plus project traffic for the intersection of US 19 and King Road. The methodology utilized to determine the need for a right turn lane was based on the FDOT publications, “Exclusive Right Turn Lanes at Unsignalized Intersections, When Should We Require Them?” The methodology utilized to determine the need for a left turn lane was based on the Highway Research Record (HRR) #211-1967 “Volume Warrants for Left Turn Storage Lanes at Unsignalized Grade Intersections”. The length of the left and right turn lanes were determined based on the FDOT Standard Index 301. The access recommendations are summarized in Table 7 and described in the following paragraphs.



**LEGEND**

- 12 = 2020 BACKGROUND TRAFFIC
- (28) = PROJECT TRAFFIC
- [27] = NUCLEAR POWER PLANT TRAFFIC

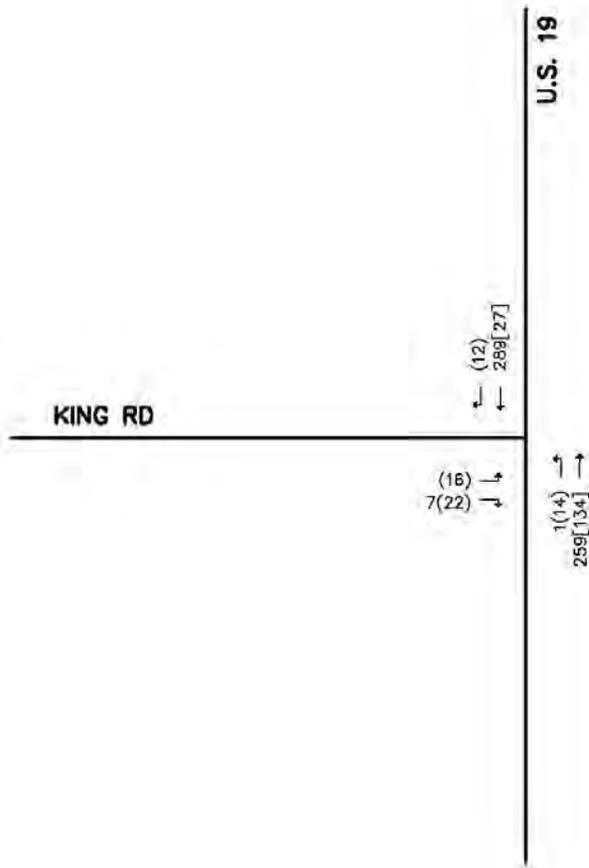


**FIGURE 3**  
**AM PEAK HOUR**  
**2020 BACKGROUND PLUS**  
**PROJECT TRAFFIC**



**LEGEND**

- 12 = 2020 BACKGROUND TRAFFIC
- (28) = PROJECT TRAFFIC
- [27] = NUCLEAR POWER PLANT TRAFFIC



**FIGURE 4**  
PM PEAK HOUR  
2020 BACKGROUND PLUS  
PROJECT TRAFFIC

TABLE 7

ACCESS RECOMMENDATIONS

<u>Intersection</u>	<u>Movement</u>	<u>Peak Period</u>	<u>Volume</u>	<u>Turn Lane Warranted?</u>	<u>Queue Storage</u>	<u>Deceleration Length (2)</u>	<u>Total Length</u>
US 19 and King Road	Northbound Left	AM	33	Yes	75'	405'	480'
	Southbound Right	AM	28	No	0'	405'	405'

(1) Queue Storage

- Northbound Left:  $(33/30) \times 50 = 55'$  Use 75'

(2) Based on FDOT Standard Index 301 and a design speed (posted + 5 MPH) of 60 MPH on US 19.

## US 19 and King Road

This intersection has full access to US 19. Based on the estimated 2020 background plus project traffic, a northbound left turn lane is warranted. Therefore, it is recommended that a 480-foot northbound left turn lane be provided. The 480 feet includes a 50-foot taper.

Based on the 2020 background plus project traffic, a southbound right turn lane is not warranted. However, due to the number of trucks entering the facility, it is recommended that a southbound right turn lane be provided. The right turn lane should be a minimum of 405 feet which includes a 50' taper.

## TRUCK ROUTE EVALUATION

As indicated in this report, the primary truck routes for the project within Levy County will be US 19, SR 121 and CR 336. According to Jimmy Pittman of the Florida Department of Transportation (FDOT), US 19 and SR 121 should be able to accommodate the additional truck traffic associated with the proposed uses through the design life of the pavement. Therefore, this analysis will evaluate the adequacy of CR 336 to accommodate the additional truck traffic from a pavement standpoint. The following outlines the methodology utilized to assess the adequacy of the pavement on CR 336.

Required Structural Number – The required structural number for the CR 336 pavement was determined utilizing the methodology outlined in the FDOT Flexible Pavement Design Manual. The parameters required to determine the structural number are as follows:

1. Equivalent Single Axle Loads (ESAL) – Table 8 provides the ESAL calculation for CR 336. As shown in Table 8, the ESAL is estimated to be 732,929 for a 2030 design year. For the purpose of this analysis, the ESAL was rounded up to 800,000.

2. Resilient Modules (M<sub>R</sub>) – Generally, the LBR of the natural soils in this area of Florida ranges in the upper twenties to thirty. For the purpose of this evaluation, an LBR of 26 was utilized:

$$\begin{aligned} M_R \text{ (PSI)} &= 10^{[0.7363 * \log(26)]} \times 809 \\ &= 8,908 \text{ PSI} \quad \text{Use 9,000 PSI} \end{aligned}$$

3. Percent Reliability (% R) – 90% reliability was utilized.

TABLE 8  
CR 336 ESAL CALCULATION

Year	<u>AA DT (1)</u>	<u>Project Traffic (2)</u>	<u>Total AADT</u>	<u>I</u>	<u>Df</u>	<u>Lf</u>	<u>E18</u>	<u>ESAL</u>	<u>Accumulated ESAL</u>
2008	0	0	0	10%	0.5	0.99	0.89	0	0
2009	473	0	473	10%	0.5	0.99	0.89	7,606	7,606
2010	487	160	647	32%	0.5	0.99	0.89	33,604	41,210
2011	502	160	662	32%	0.5	0.99	0.89	33,851	75,061
2012	517	160	677	31%	0.5	0.99	0.89	34,074	109,135
2013	533	160	693	31%	0.5	0.99	0.89	34,322	143,457
2014	549	160	709	30%	0.5	0.99	0.89	34,544	178,001
2015	565	160	725	30%	0.5	0.99	0.89	34,858	212,859
2016	582	160	742	29%	0.5	0.99	0.89	35,078	247,937
2017	599	160	759	29%	0.5	0.99	0.89	35,394	283,331
2018	617	160	777	29%	0.5	0.99	0.89	35,609	318,940
2019	636	160	796	28%	0.5	0.99	0.89	35,967	354,907
2020	655	160	815	28%	0.5	0.99	0.89	36,302	391,209
2021	675	160	835	27%	0.5	0.99	0.89	36,521	427,730
2022	695	160	855	27%	0.5	0.99	0.89	36,846	464,576
2023	716	160	876	26%	0.5	0.99	0.89	37,187	501,763
2024	737	160	897	26%	0.5	0.99	0.89	37,646	539,409
2025	759	160	919	26%	0.5	0.99	0.89	37,978	577,387
2026	782	160	942	25%	0.5	0.99	0.89	38,323	615,710
2027	805	160	965	25%	0.5	0.99	0.89	38,638	654,348
2028	829	160	989	25%	0.5	0.99	0.89	39,122	693,470
2029	854	160	1,014	24%	0.5	0.99	0.89	39,459	732,929
2030	880	160	1,040	24%	0.5	0.99	0.89	39,801	772,730

- (1) Based on a 24-hour machine count conducted 12/15/09 and a 3% growth rate.  
(2) Estimated truck traffic for Tarmac facility.

Based on the above parameters, Table A.4A was utilized from the FDOT Flexible Pavement Design Manual to determine the required structural number (SN) for the roadway. Based on this table, the required  $SN_R$  is 3.12.

Existing Structural Number – Based on the pavement evaluation provided by Universal Engineering Sciences, the existing structural number ( $SN_E$ ) for the roadway ranges between 3.2 and 3.4.

Therefore, based on the above, the existing pavement should be adequate to accommodate the existing and proposed truck traffic.

## APPENDIX

## TRIP GENERATION

TABLE A-1

## ESTIMATED PROJECT TRAFFIC BY HOUR

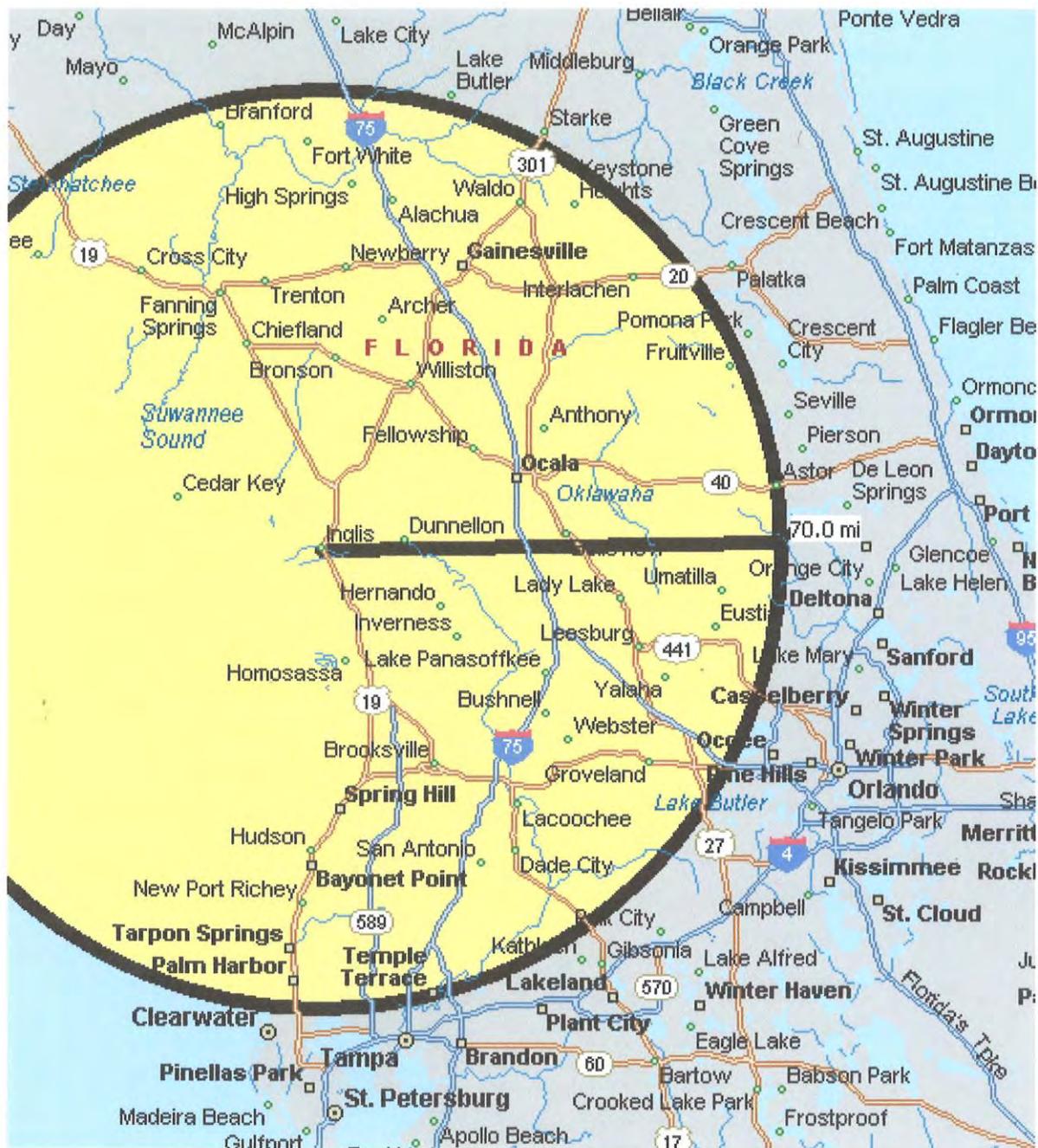
<u>Time</u>	<u>Employee Traffic</u>			<u>Truck Traffic</u>		
	<u>In</u>	<u>Out</u>	<u>Total</u>	<u>In</u>	<u>Out</u>	<u>Total</u>
6 - 7 AM	14	0	14	0	0	0
7 - 8 AM	4	0	4	53	53	106
8 - 9 AM	0	0	0	60	59	119
9 - 10 AM	2	0	2	62	61	123
10 - 11 AM	15	0	15	61	60	121
11 - 12 PM	2	2	4	53	53	106
12 - 1 PM	2	2	4	46	46	92
1 - 2 PM	2	2	4	43	42	85
2 - 3 PM	2	2	4	48	48	96
3 - 4 PM	0	10	10	44	44	88
4 - 5 PM	0	8	8	22	26	48
5 - 6 PM	0	0	0	8	8	16
6 - 7 PM	0	0	0	0	0	0
7 - 8 PM	0	17	17	0	0	0
Total	43	43	86	500	500	1,000

## DISTRIBUTION DETERMINATION

TABLE A-2

## PROJECT TRAFFIC DISTRIBUTION ESTIMATE

City	Unadjusted		30% Reduction		Direction	Source per Wikipedia
	Population	Percent	Population	Percent		
Dunnellon	1,951		1,951		East	2004 Census Estimate
Inglis	1,491		1,491		East	2000 Census
Lacoochee	1,345		1,345		East	2000 Census
Lady Lake	13,244		13,244		East	2005 Census Estimate
Ocala	54,801		54,801		East	2008 Census Data
Umatilla	<u>2,502</u>		<u>2,502</u>		East	2004 Census Estimate
East Total	75,334	13%	75,334	16%		
Branford	695		695		North	2000 Census
Bronson	964		964		North	2000 Census
Cheifland	2,095		2,095		North	2005 Census Estimate
Cross City	1,800		1,800		North	2004 Census Estimate
Fanning Springs	800		800		North	2004 Census Estimate
Fort White	477		477		North	2007 Census Estimate
High Springs	4,139		4,139		North	2004 Census Estimate
Newberry	3,630		3,630		North	2004 Census Estimate
Trenton	<u>1,722</u>		<u>1,722</u>		North	April 1, 2008 Census Estimate
North Total	16,322	3%	16,322	4%		
Alachua	7,554		7,554		Northeast	2006 Census Estimate
Archer	1,302		1,302		Northeast	2006 Census Estimate
Gainesville	114,916		114,916		Northeast	2008 Census Data
Interlachen	1,475		1,475		Northeast	2000 Census
Keystone Heights	1,392		1,392		Northeast	2004 Census Estimate
Waldo	784		784		Northeast	2004 Census Estimate
Williston	<u>2,467</u>		<u>2,467</u>		Northeast	2004 Census Estimate
NE Total	129,890	23%	129,890	28%		
Bayonet Point	25,500		17,850		South	2008 Census Data
Brooksville	7,264		5,085		South	2000 Census
Bushnell	2,050		1,435		South	2000 Census
Cedar Key	958		671		South	2005 Census Estimate
Dade City	6,615		4,631		South	2004 Census Estimate
Groveland	7,647		5,353		South	2008 Census Estimate
Hernando	8,253		5,777		South	2000 Census
Homosassa	2,294		1,606		South	2000 Census
Hudson	12,765		8,936		South	2000 Census
Inverness	7,248		5,074		South	2007 Census Estimate
Lake Panasoffkee	3,413		2,389		South	2000 Census
Leesburg	22,113		15,479		South	2008 Census Data
New Port Richey	26,033		18,223		South	2000 Census
Palm Harbor	62,000		43,400		South	2008 Census Data
San Antonio	913		639		South	2004 Census Estimate
Spring Hill	99,500		69,650		South	2008 Census Data
Tarpon Springs	23,369		16,358		South	2008 Census Data
Temple Terrace	22,619		15,833		South	2008 Census Data
Webster	819		573		South	2004 Census Estimate
Yalaha	<u>1,175</u>		<u>823</u>		South	2000 Census
South Total	342,548	61%	239,785	52%		



### 70 Mile Radius

#### Driving Distances

Palm Harbor – 72	North Tampa – 77	Ocoee – 90	Lake Butler – 88
Clearwater – 80	Keystone Heights – 79	Pierson – 89	Branford – 75
Zephyrhills - 75	Polk City – 101	Stark – 78	Kathleen – 90

2009 FDOT Q/LOS GENERALIZED TABLES

**TABLE 3**

**Generalized Annual Average Daily Volumes for Florida's  
Rural Undeveloped Areas and Cities OR  
Developed Areas Less than 5,000 Population<sup>1</sup>**

9/4/09

Rural Undeveloped Areas						Cities or Rural Developed Areas Less Than 5000					
<b>FREEWAYS</b>						<b>FREEWAYS</b>					
Lanes	B	C	D	E		Lanes	B	C	D	E	
4	37,100	50,800	59,900	63,700		4	37,100	49,900	59,400	63,700	
6	56,500	76,400	89,900	98,300		6	54,800	74,600	89,000	98,300	
8	75,100	101,100	119,900	132,900		8	73,300	100,200	118,700	132,700	
<b>Freeway Adjustments</b>						<b>Freeway Adjustments</b>					
Auxiliary Lanes +18,000						Auxiliary Lanes +18,000					
<b>UNINTERRUPTED FLOW TWO-LANE HIGHWAYS</b>						<b>UNINTERRUPTED FLOW HIGHWAYS</b>					
Lanes	Median	B	C	D	E	Lanes	Median	B	C	D	E
2	Undivided	4,500	8,100	13,800	27,600	2	Undivided	7,800	14,200	20,000	25,600
<b>Passing Lane Adjustment</b>						<b>Uninterrupted Flow Highway Adjustments</b>					
Alter LOS B-D volumes in proportion to passing lane length to the highway segment length.						Lanes Median Exclusive left lanes Adjustment factors					
<b>UNINTERRUPTED FLOW MULTILANE HIGHWAYS</b>						<b>State Signalized Arterials</b>					
Lanes	Median	B	C	D	E	Lanes	Median	B	C	D	E
4	Divided	26,300	41,100	52,100	59,100	2	Undivided	**	9,800	13,000	13,900
6	Divided	39,400	61,700	78,000	88,600	4	Divided	**	23,300	28,000	29,900
<b>ISOLATED STATE SIGNALIZED INTERSECTIONS</b>						<b>Non-State Signalized Roadway Adjustments</b>					
Lanes	B	C	D	E		(Alter corresponding state volumes by the indicated percent.)					
2	**	4,700	10,400	12,300		Major City/County Roadways - 10%					
4	**	10,300	23,200	25,500		Other Signalized Roadways - 35%					
6	**	15,800	36,000	38,500		<b>State &amp; Non-State Signalized Roadway Adjustments</b>					
<b>BICYCLE MODE<sup>2</sup></b>						<b>Divided/Undivided &amp; Turn Lane Adjustments</b>					
(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)						(Alter corresponding volume by the indicated percent.)					
Paved Shoulder/ Bicycle Lane	B	C	D	E		Lanes	Median	Exclusive Left Turn Lanes	Exclusive Right Turn Lanes	Adjustment Factors	
Coverage	**	**	**	7,800		2	Divided	Yes	No	+5%	
0-49%	**	**	**	14,000		2	Undivided	No	No	-20%	
50-84%	**	**	**	14,000		Multi	Undivided	Yes	No	-5%	
85-100%	**	4,200	>4,200	***		Multi	Undivided	No	No	-25%	
<b>BICYCLE MODE<sup>2</sup></b>						<b>PEDESTRIAN MODE<sup>2</sup></b>					
(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)						(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					
Paved Shoulder/ Bicycle Lane	B	C	D	E		Sidewalk	B	C	D	E	
Coverage	**	2,800	7,300	>7,300		Coverage	**	**	5,000	14,400	
0-49%	**	2,800	7,300	>7,300		0-49%	**	**	11,300	18,800	
50-84%	2,200	3,400	13,100	>13,100		50-84%	**	**	11,300	18,800	
85-100%	4,100	>4,100	***	***		85-100%	**	11,400	18,800	>18,800	

<sup>1</sup> Values shown are presented as two-way annual average daily volumes for levels of service and are for the automobile/truck modes unless specifically stated. Although presented as daily volumes, they actually represent peak hour direction conditions with applicable K and D factors applied. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model and Pedestrian LOS Model, respectively for the automobile/truck, bicycle, and pedestrian modes.

<sup>2</sup> Level of service for the bicycle and pedestrian modes in this table is based on number of motorized vehicles, not number of bicyclists or pedestrians using the facility.

\*\* Cannot be achieved using table input value defaults.

\*\*\* Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.

**Source:**

Florida Department of Transportation  
Systems Planning Office  
605 Suwannee Street, MS 19  
Tallahassee, FL 32399-0450

**TABLE 6** Generalized Peak Hour Two-Way Volumes for Florida's Rural Undeveloped Areas and Cities OR Developed Areas Less Than 5,000 Population<sup>1</sup>

9/4/09

Rural Undeveloped Areas					Cities or Rural Developed Areas Less Than 5000						
<b>FREEWAYS</b>					<b>FREEWAYS</b>						
Lanes	B	C	D	E	Lanes	B	C	D	E		
4	3,820	5,230	6,170	6,560	4	3,820	5,140	6,110	6,560		
6	5,820	7,870	9,260	10,120	6	5,640	7,690	9,170	10,120		
8	7,730	10,410	12,350	13,690	8	7,550	10,320	12,220	13,670		
<b>Freeway Adjustments</b> Auxiliary Lanes +1,800					<b>Freeway Adjustments</b> Auxiliary lanes +1,800						
<b>UNINTERRUPTED FLOW TWO-LANE HIGHWAYS</b>					<b>UNINTERRUPTED FLOW HIGHWAYS</b>						
Lanes	Median	B	C	D	E	Lanes	Median	B	C	D	E
2	Undivided	440	790	1,350	2,700	2	Undivided	770	1,420	2,000	2,550
<b>Passing Lane Adjustment</b> Alter LOS B-D volumes in proportion to passing lane length to the highway segment length.					<b>Uninterrupted Flow Highway Adjustments</b>						
<b>UNINTERRUPTED FLOW MULTILANE HIGHWAYS</b>					<b>Uninterrupted Flow Highway Adjustments</b>						
Lanes	Median	B	C	D	E	Lanes	Median	Exclusive left lanes	Adjustment factors		
4	Divided	2,570	4,020	5,100	5,790	2	Divided	Yes	+5%		
6	Divided	3,860	6,040	7,640	8,680	Multi	Undivided	Yes	-5%		
<b>ISOLATED STATE SIGNALIZED INTERSECTIONS</b>					<b>STATE SIGNALIZED ARTERIALS</b>						
Lanes	B	C	D	E	Lanes	Median	B	C	D	E	
2	**	460	1,020	1,200	2	Undivided	**	950	1,260	1,350	
4	**	1,000	2,280	2,500	4	Divided	**	2,260	2,710	2,900	
6	**	1,550	3,530	3,770	6	Divided	**	3,530	4,110	4,370	
<b>BICYCLE MODE<sup>2</sup></b> (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					<b>Non-State Signalized Roadway Adjustments</b> (Alter corresponding volume by the indicated percent.)						
Paved Shoulder/ Bicycle Lane					Major City/County Roadways - 10% Other Signalized Roadways - 35%						
Coverage	B	C	D	E	<b>State &amp; Non-State Signalized Roadway Adjustments</b> (Alter corresponding volume by the indicated percent.)						
0-49%	**	**	**	770	<b>Divided/Undivided &amp; Turn Lane Adjustments</b>						
50-84%	**	**	**	1,370	Exclusive Left Turn Lanes      Exclusive Right Turn Lanes      Adjustment Factors						
85-100%	**	410	>410	***	Lanes	Median	Left Turn Lanes	Right Turn Lanes	Adjustment Factors		
<sup>1</sup> Values shown are presented as hourly two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. Although presented as peak hour two-way volume, they actually represent peak hour direction conditions with an applicable D factor applied. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model and Pedestrian LOS Model, respectively for the automobile/truck, bicycle, and pedestrian modes. <sup>2</sup> Level of service for the bicycle and pedestrian modes in this table is based on number of motorized vehicles, not number of bicyclists or pedestrians using the facility. ** Cannot be achieved using table input value defaults. *** Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.					2	Divided	Yes	No	+5%		
					2	Undivided	No	No	-20%		
					Multi	Undivided	Yes	No	-5%		
					Multi	Undivided	No	No	-25%		
-	-	-	Yes	+15%							
<b>BICYCLE MODE<sup>2</sup></b> (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					<b>BICYCLE MODE<sup>2</sup></b> (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)						
Paved Shoulder/ Bicycle Lane					Paved Shoulder/ Bicycle Lane						
Coverage	B	C	D	E	Coverage	B	C	D	E		
0-49%	**	270	710	>710	0-49%	**	270	710	>710		
50-84%	220	330	1,270	>1,270	50-84%	220	330	1,270	>1,270		
85-100%	400	>400	***	***	85-100%	400	>400	***	***		
<b>PEDESTRIAN MODE<sup>2</sup></b> (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					<b>PEDESTRIAN MODE<sup>2</sup></b> (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)						
Sidewalk					Sidewalk						
Coverage	B	C	D	E	Coverage	B	C	D	E		
0-49%	**	**	480	1,390	0-49%	**	**	480	1,390		
50-84%	**	**	1,100	1,820	50-84%	**	**	1,100	1,820		
85-100%	**	1,100	1,820	>1,820	85-100%	**	1,100	1,820	>1,820		

MACHINE COUNTS

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1215004.PRN  
 Station : 000012140904  
 Identification : 000138590003 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of Shirley Road

\*\*\*\*\*

Dec 15 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	5	3	6	4	3	11	20	33	25	46	40	47
30	8	2	1	7	11	7	37	32	30	44	39	46
45	5	3	5	1	4	14	49	36	45	48	36	32
00	4	2	3	3	14	13	22	38	57	43	53	47
Hr Total	22	10	15	15	32	45	128	139	157	181	168	172

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	45	37	35	52	40	52	43	33	23	11	18	11
30	52	49	39	54	43	51	35	19	13	11	7	5
45	35	46	45	51	42	54	26	23	21	10	5	6
00	45	41	47	43	41	48	18	18	13	8	9	5
Hr Total	177	173	166	200	166	205	122	93	70	40	39	27

24 Hour Total : 2562  
 AM peak hour begins : 08:45 AM peak volume : 195 Peak hour factor : 0.86  
 PM peak hour begins : 17:00 PM peak volume : 205 Peak hour factor : 0.95

\*\*\*\*\*

Dec 15 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	1	2	3	5	24	36	20	24	39	41	46
30	1	3	10	10	4	23	36	47	26	34	53	32
45	8	2	0	2	16	18	19	43	41	31	37	55
00	8	5	7	10	13	27	28	29	34	59	36	53
Hr Total	19	11	19	25	38	92	119	139	125	163	167	186

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	46	39	46	30	57	55	41	38	30	13	8	10
30	39	57	42	36	48	52	36	30	15	8	8	8
45	42	41	43	45	56	37	33	28	19	8	2	8
00	46	44	52	56	47	38	34	14	16	14	12	7
Hr Total	173	181	183	167	208	182	144	110	80	43	30	33

24 Hour Total : 2637  
 AM peak hour begins : 11:30 AM peak volume : 193 Peak hour factor : 0.88  
 PM peak hour begins : 15:45 PM peak volume : 217 Peak hour factor : 0.95

\*\*\*\*\*

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1215004.PRN  
 Station : 000012140904  
 Identification : 000138590003 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of Shirley Road

\*\*\*\*\*

Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	7	4	8	7	8	35	56	53	49	85	81	93
30	9	5	11	17	15	30	73	79	56	78	92	78
45	13	5	5	3	20	32	68	79	86	79	73	87
00	12	7	10	13	27	40	50	67	91	102	89	100
Hr Total	41	21	34	40	70	137	247	278	282	344	335	358

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	91	76	81	82	97	107	84	71	53	24	26	21
30	91	106	81	90	91	103	71	49	28	19	15	13
45	77	87	88	96	98	91	59	51	40	18	7	14
00	91	85	99	99	88	86	52	32	29	22	21	12
Hr Total	350	354	349	367	374	387	266	203	150	83	69	60

24 Hour Total : 5199  
 AM peak hour begins : 11:30 AM peak volume : 369 Peak hour factor : 0.92  
 PM peak hour begins : 16:30 PM peak volume : 396 Peak hour factor : 0.93  
 \*\*\*\*\*

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1216004.PRN  
 Station : 000012140904  
 Identification : 000138590003 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of Shirley Road

\*\*\*\*\*

Dec 16 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	3	3	5	7	13	18	25	42	41	50	37
30	6	3	4	8	4	8	27	30	49	41	50	44
45	5	2	4	7	11	15	21	22	30	53	45	42
00	3	1	4	3	10	21	25	41	38	44	49	41
Hr Total	18	9	15	23	32	57	91	118	159	179	194	164

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	52	33	56	41	42	47	59	26	25	11	8	5
30	50	41	49	48	38	48	40	18	19	13	11	18
45	38	35	53	39	37	55	20	27	9	16	10	3
00	44	48	49	50	44	61	32	15	11	8	1	3
Hr Total	184	157	207	178	161	211	151	86	64	48	30	29

24 Hour Total : 2565  
 AM peak hour begins : 09:30 AM peak volume : 197 Peak hour factor : 0.93  
 PM peak hour begins : 17:15 PM peak volume : 223 Peak hour factor : 0.91

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Dec 16 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	5	7	4	7	22	27	34	27	29	36	51
30	3	2	4	8	3	15	41	33	31	43	36	55
45	6	2	8	3	14	25	21	37	28	47	30	46
00	3	2	0	3	21	23	27	25	35	43	50	45
Hr Total	16	11	19	18	45	85	116	129	121	162	152	197

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	39	39	62	45	40	51	38	36	34	9	11	9
30	41	55	41	43	52	46	26	29	18	5	11	16
45	34	41	51	41	46	54	40	20	12	15	8	4
00	34	45	41	56	44	44	34	20	8	11	6	6
Hr Total	148	180	195	185	182	195	138	105	72	40	36	35

24 Hour Total : 2582  
 AM peak hour begins : 10:45 AM peak volume : 202 Peak hour factor : 0.92  
 PM peak hour begins : 13:15 PM peak volume : 203 Peak hour factor : 0.82

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216004.PRN  
 Station : 000012140904  
 Identification : 000138590003 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of Shirley Road

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Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	8	8	10	9	14	35	45	59	69	70	86	88
30	9	5	8	16	7	23	68	63	80	84	86	99
45	11	4	12	10	25	40	42	59	58	100	75	88
00	6	3	4	6	31	44	52	66	73	87	99	86

Hr Total 34 20 34 41 77 142 207 247 280 341 346 361

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	91	72	118	86	82	98	97	62	59	20	19	14
30	91	96	90	91	90	94	66	47	37	18	22	34
45	72	76	104	80	83	109	60	47	21	31	18	7
00	78	93	90	106	88	105	66	35	19	19	7	9

Hr Total 332 337 402 363 343 406 289 191 136 88 66 64

24 Hour Total : 5147  
 AM peak hour begins : 10:45 AM peak volume : 374 Peak hour factor : 0.94  
 PM peak hour begins : 17:00 PM peak volume : 406 Peak hour factor : 0.93  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1217004.PRN  
 Station : 000012140904  
 Identification : 000138590003 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of Shirley Road

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Dec 17 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	1	2	4	4	18	31	31	31	38	53	54
30	9	4	2	2	4	10	26	26	48	55	42	49
45	2	0	5	2	6	23	31	45	50	38	42	62
00	1	3	5	7	8	16	21	39	37	30	51	60
Hr Total	18	8	14	15	22	67	109	141	166	161	188	225

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	48	53	58	38	48	46	48	19	20	11	8	10
30	41	50	49	41	47	63	42	30	17	19	12	11
45	37	50	36	55	48	54	40	24	26	14	12	8
00	43	48	52	59	52	66	32	23	16	14	8	10
Hr Total	169	201	195	193	195	229	162	96	79	58	40	39

24 Hour Total : 2790  
 AM peak hour begins : 11:00 AM peak volume : 225 Peak hour factor : 0.91  
 PM peak hour begins : 17:15 PM peak volume : 231 Peak hour factor : 0.88

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Dec 17 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	8	2	6	10	28	29	28	22	34	38	35
30	1	2	5	6	10	22	26	29	19	28	33	41
45	4	3	1	7	10	20	21	34	31	34	46	48
00	3	3	5	7	8	25	26	28	26	43	39	52
Hr Total	12	16	13	26	38	95	102	119	98	139	156	176

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	54	40	47	68	50	48	39	28	23	19	14	3
30	70	53	51	50	67	43	34	24	19	24	10	6
45	35	48	54	48	49	44	37	31	15	26	13	21
00	52	46	57	46	44	34	32	18	15	18	9	1
Hr Total	211	187	209	212	210	169	142	101	72	87	46	31

24 Hour Total : 2667  
 AM peak hour begins : 11:30 AM peak volume : 224 Peak hour factor : 0.80  
 PM peak hour begins : 14:15 PM peak volume : 230 Peak hour factor : 0.85

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217004.PRN  
 Station : 000012140904  
 Identification : 000138590003 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of Shirley Road

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Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	10	9	4	10	14	46	60	59	53	72	91	89
30	10	6	7	8	14	32	52	55	67	83	75	90
45	6	3	6	9	16	43	52	79	81	72	88	110
00	4	6	10	14	16	41	47	67	63	73	90	112
Hr Total	30	24	27	41	60	162	211	260	264	300	344	401

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	102	93	105	106	98	94	87	47	43	30	22	13
30	111	103	100	91	114	106	76	54	36	43	22	17
45	72	98	90	103	97	98	77	55	41	40	25	29
00	95	94	109	105	96	100	64	41	31	32	17	11
Hr Total	380	388	404	405	405	398	304	197	151	145	86	70

24 Hour Total : 5457  
 AM peak hour begins : 11:30 AM peak volume : 435 Peak hour factor : 0.97  
 PM peak hour begins : 15:30 PM peak volume : 420 Peak hour factor : 0.92  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215002.PRN  
 Station : 000012140905  
 Identification : 000039640003 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 northwest of SR 121/CR 336

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Dec 15 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	1	5	2	3	7	8	27	18	44	29	39
30	6	3	1	2	4	4	25	25	21	32	29	51
45	3	0	2	4	2	5	22	41	28	27	26	27
00	4	4	3	2	12	6	28	20	38	36	32	22
Hr Total	14	8	11	10	21	22	83	113	105	139	116	139

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	30	21	18	26	23	27	33	12	10	7	7	6
30	39	43	30	34	24	42	18	19	11	11	7	4
45	29	35	28	47	32	35	11	16	11	6	1	5
00	31	32	35	35	39	23	17	11	9	10	7	2
Hr Total	129	131	111	142	118	127	79	58	41	34	22	17

24 Hour Total : 1790  
 AM peak hour begins : 10:45 AM peak volume : 149 Peak hour factor : 0.73  
 PM peak hour begins : 16:45 PM peak volume : 143 Peak hour factor : 0.85

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Dec 15 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	2	2	2	16	23	24	14	20	32	30
30	4	1	4	8	12	5	16	17	40	16	31	34
45	5	4	6	0	4	16	19	21	20	37	25	42
00	3	4	2	2	10	27	11	16	14	38	30	25
Hr Total	12	9	14	12	28	64	69	78	88	111	118	131

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	21	34	36	25	34	34	22	32	14	4	10	11
30	26	36	35	37	31	40	27	16	11	11	4	9
45	28	34	35	47	35	17	17	22	11	8	3	4
00	37	35	36	44	33	36	18	15	22	8	5	8
Hr Total	112	139	142	153	133	127	84	85	58	31	22	32

24 Hour Total : 1852  
 AM peak hour begins : 09:30 AM peak volume : 138 Peak hour factor : 0.91  
 PM peak hour begins : 15:15 PM peak volume : 162 Peak hour factor : 0.86

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215002.PRN  
 Station : 000012140905  
 Identification : 000039640003 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 northwest of SR 121/CR 336

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Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	1	7	4	5	23	31	51	32	64	61	69
30	10	4	5	10	16	9	41	42	61	48	60	85
45	8	4	8	4	6	21	41	62	48	64	51	69
00	7	8	5	4	22	33	39	36	52	74	62	47
Hr Total	26	17	25	22	49	86	152	191	193	250	234	270

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	51	55	54	51	57	61	55	44	24	11	17	17
30	65	79	65	71	55	82	45	35	22	22	11	13
45	57	69	63	94	67	52	28	38	22	14	4	9
00	68	67	71	79	72	59	35	26	31	18	12	10
Hr Total	241	270	253	295	251	254	163	143	99	65	44	49

24 Hour Total : 3642  
 AM peak hour begins : 10:45 AM peak volume : 285 Peak hour factor : 0.84  
 PM peak hour begins : 15:15 PM peak volume : 301 Peak hour factor : 0.80  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216002.PRN  
 Station : 000012140905  
 Identification : 000039640003 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 northwest of SR 121/CR 336

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Dec 16 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	3	1	0	2	2	6	15	13	28	27	37	32
30	3	4	7	1	6	7	19	31	36	34	36	29
45	1	3	1	9	8	15	14	16	24	38	30	39
00	3	1	3	5	3	11	18	24	17	31	40	27
Hr Total	10	9	11	17	19	39	66	84	105	130	143	127

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	35	33	39	29	23	31	33	16	18	6	7	2
30	41	32	30	25	31	32	34	14	12	5	8	10
45	36	24	35	38	24	30	14	13	6	9	6	7
00	34	30	30	24	28	52	19	9	8	4	5	4
Hr Total	146	119	134	116	106	145	100	52	44	24	26	23

24 Hour Total : 1795  
 AM peak hour begins : 10:00 AM peak volume : 143 Peak hour factor : 0.89  
 PM peak hour begins : 17:30 PM peak volume : 149 Peak hour factor : 0.72

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Dec 16 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	3	7	1	3	8	20	16	13	19	18	32
30	2	1	6	8	5	13	15	9	20	31	25	32
45	4	0	3	0	6	14	11	28	20	36	24	31
00	2	2	0	8	14	20	16	15	31	25	32	28
Hr Total	12	6	16	17	28	55	62	68	84	111	99	123

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	40	44	52	43	26	35	29	32	14	4	10	9
30	23	35	36	37	36	28	28	19	18	11	3	7
45	31	29	29	36	40	42	28	18	7	9	7	3
00	24	41	29	35	41	28	17	19	12	6	6	7
Hr Total	118	149	146	151	143	133	102	88	51	30	26	26

24 Hour Total : 1844  
 AM peak hour begins : 11:15 AM peak volume : 131 Peak hour factor : 0.82  
 PM peak hour begins : 13:30 PM peak volume : 158 Peak hour factor : 0.76

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216002.PRN  
 Station : 000012140905  
 Identification : 000039640003 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 northwest of SR 121/CR 336

\*\*\*\*\*

Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	7	4	7	3	5	14	35	29	41	46	55	64
30	5	5	13	9	11	20	34	40	56	65	61	61
45	5	3	4	9	14	29	25	44	44	74	54	70
00	5	3	3	13	17	31	34	39	48	56	72	55
Hr Total	22	15	27	34	47	94	128	152	189	241	242	250

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	75	77	91	72	49	66	62	48	32	10	17	11
30	64	67	66	62	67	60	62	33	30	16	11	17
45	67	53	64	74	64	72	42	31	13	18	13	10
00	58	71	59	59	69	80	36	28	20	10	11	11
Hr Total	264	268	280	267	249	278	202	140	95	54	52	49

24 Hour Total : 3639  
 AM peak hour begins : 10:45 AM peak volume : 267 Peak hour factor : 0.93  
 PM peak hour begins : 13:45 PM peak volume : 292 Peak hour factor : 0.80  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217002.PRN  
 Station : 000012140905  
 Identification : 000039640003 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 northwest of SR 121/CR 336

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Dec 17 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	1	2	2	3	13	16	26	25	30	40	25
30	5	5	2	3	3	6	13	23	22	26	36	57
45	1	0	1	3	7	15	17	34	42	37	29	35
00	0	1	2	4	3	11	17	27	32	29	25	46
Hr Total	12	7	7	12	16	45	63	110	121	122	130	163

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	29	37	37	34	34	34	37	18	10	12	5	11
30	30	38	31	30	27	33	28	17	12	8	6	7
45	25	38	33	25	38	46	33	13	17	12	11	5
00	26	40	31	37	31	35	25	24	10	11	3	13
Hr Total	110	153	132	126	130	148	123	72	49	43	25	36

24 Hour Total : 1955  
 AM peak hour begins : 11:15 AM peak volume : 167 Peak hour factor : 0.73  
 PM peak hour begins : 13:00 PM peak volume : 153 Peak hour factor : 0.96

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Dec 17 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	1	1	6	7	12	18	18	14	13	18	25
30	3	3	4	7	2	12	15	17	19	28	32	30
45	5	2	1	7	9	14	14	14	11	26	32	44
00	4	3	0	0	6	16	13	10	26	36	32	42
Hr Total	12	9	6	20	24	54	60	59	70	103	114	141

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	41	33	38	33	49	36	23	12	16	16	13	5
30	32	35	41	39	44	31	31	17	10	14	9	11
45	35	39	45	40	38	29	22	21	14	20	4	13
00	28	41	53	36	33	36	28	16	17	13	4	3
Hr Total	136	148	177	148	164	132	104	66	57	63	30	32

24 Hour Total : 1929  
 AM peak hour begins : 11:30 AM peak volume : 159 Peak hour factor : 0.90  
 PM peak hour begins : 14:00 PM peak volume : 177 Peak hour factor : 0.83

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1217002.PRN  
 Station : 000012140905  
 Identification : 000039640003 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 northwest of SR 121/CR 336

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Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	2	3	8	10	25	34	44	39	43	58	50
30	8	8	6	10	5	18	28	40	41	54	68	87
45	6	2	2	10	16	29	31	48	53	63	61	79
00	4	4	2	4	9	27	30	37	58	65	57	88
Hr Total	24	16	13	32	40	99	123	169	191	225	244	304

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	70	70	75	67	83	70	60	30	26	28	18	16
30	62	73	72	69	71	64	59	34	22	22	15	18
45	60	77	78	65	76	75	55	34	31	32	15	18
00	54	81	84	73	64	71	53	40	27	24	7	16
Hr Total	246	301	309	274	294	280	227	138	106	106	55	68

24 Hour Total : 3884  
 AM peak hour begins : 11:15 AM peak volume : 324 Peak hour factor : 0.92  
 PM peak hour begins : 14:00 PM peak volume : 309 Peak hour factor : 0.92  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215007.PRN  
 Station : 000012140901  
 Identification : 000065310001 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of CR 40

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Dec 15 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	7	7	6	7	8	28	57	60	69	57	79
30	9	4	5	5	6	13	49	51	55	73	69	83
45	9	5	4	2	10	23	47	53	67	82	71	74
00	4	4	6	8	19	23	57	51	79	77	81	88
Hr Total	28	20	22	21	42	67	181	212	261	301	278	324

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	99	86	71	99	77	122	86	61	47	20	20	13
30	90	77	76	100	78	102	56	50	28	29	16	4
45	65	102	84	96	93	116	60	42	26	20	14	13
00	74	71	95	82	101	96	49	32	23	22	17	5
Hr Total	328	336	326	377	349	436	251	185	124	91	67	35

24 Hour Total : 4662  
 AM peak hour begins : 11:30 AM peak volume : 351 Peak hour factor : 0.89  
 PM peak hour begins : 16:45 PM peak volume : 441 Peak hour factor : 0.90

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Dec 15 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	1	4	5	7	33	72	55	60	78	79	72
30	3	4	9	7	12	37	56	75	55	72	70	73
45	10	5	9	5	25	39	56	68	81	64	86	77
00	10	5	7	8	23	62	51	69	64	85	62	97
Hr Total	29	15	29	25	67	171	235	267	260	299	297	319

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	77	94	82	74	83	86	75	61	47	28	15	10
30	90	92	90	72	88	95	53	44	31	20	15	12
45	80	79	89	80	98	86	61	32	26	16	7	12
00	73	70	88	85	83	61	50	36	26	20	15	13
Hr Total	320	335	349	311	352	328	239	173	130	84	52	47

24 Hour Total : 4733  
 AM peak hour begins : 11:30 AM peak volume : 341 Peak hour factor : 0.88  
 PM peak hour begins : 16:30 PM peak volume : 362 Peak hour factor : 0.92

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215007.PRN  
 Station : 000012140901  
 Identification : 000065310001 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of CR 40

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Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	12	8	11	11	14	41	100	112	120	147	136	151
30	12	8	14	12	18	50	105	126	110	145	139	156
45	19	10	13	7	35	62	103	121	148	146	157	151
00	14	9	13	16	42	85	108	120	143	162	143	185
Hr Total	57	35	51	46	109	238	416	479	521	600	575	643

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	176	180	153	173	160	208	161	122	94	48	35	23
30	180	169	166	172	166	197	109	94	59	49	31	16
45	145	181	173	176	191	202	121	74	52	36	21	25
00	147	141	183	167	184	157	99	68	49	42	32	18
Hr Total	648	671	675	688	701	764	490	358	254	175	119	82

24 Hour Total : 9395  
 AM peak hour begins : 11:30 AM peak volume : 692 Peak hour factor : 0.94  
 PM peak hour begins : 16:45 PM peak volume : 791 Peak hour factor : 0.95  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216007.PRN  
 Station : 000012140901  
 Identification : 000065310001 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of CR 40

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Dec 16 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	7	5	4	6	8	10	31	50	55	69	83	77
30	3	4	6	4	4	17	27	42	79	75	77	86
45	6	6	6	8	12	17	35	48	63	75	80	69
00	6	0	11	3	23	28	41	70	62	91	67	94
Hr Total	22	15	27	21	47	72	134	210	259	310	307	326

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	85	77	79	92	90	109	85	60	37	13	22	14
30	88	59	100	92	96	116	59	35	23	20	21	18
45	83	72	84	96	89	115	45	34	26	25	8	8
00	88	88	84	83	102	107	51	31	34	22	8	9
Hr Total	344	296	347	363	377	447	240	160	120	80	59	49

24 Hour Total : 4632  
 AM peak hour begins : 11:30 AM peak volume : 336 Peak hour factor : 0.89  
 PM peak hour begins : 17:00 PM peak volume : 447 Peak hour factor : 0.96

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Dec 16 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	6	2	1	13	43	59	57	56	73	70	83
30	5	3	8	10	10	37	70	62	56	72	80	92
45	3	2	7	5	23	43	64	84	57	66	78	87
00	6	3	1	3	28	40	45	51	62	77	87	83
Hr Total	20	14	18	19	74	163	238	254	231	288	315	345

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	64	75	97	80	92	99	61	53	35	28	19	11
30	88	81	94	93	84	72	59	40	36	16	15	15
45	69	73	93	89	91	61	57	34	21	24	20	13
00	68	96	87	80	84	90	44	36	25	15	12	9
Hr Total	289	325	371	342	351	322	221	163	117	83	66	48

24 Hour Total : 4677  
 AM peak hour begins : 10:45 AM peak volume : 349 Peak hour factor : 0.95  
 PM peak hour begins : 13:45 PM peak volume : 380 Peak hour factor : 0.98

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216007.PRN  
 Station : 000012140901  
 Identification : 000065310001 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of CR 40

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Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	13	11	6	7	21	53	90	107	111	142	153	160
30	8	7	14	14	14	54	97	104	135	147	157	178
45	9	8	13	13	35	60	99	132	120	141	158	156
00	12	3	12	6	51	68	86	121	124	168	154	177
Hr Total	42	29	45	40	121	235	372	464	490	598	622	671

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	149	152	176	172	182	208	146	113	72	41	41	25
30	176	140	194	185	180	188	118	75	59	36	36	33
45	152	145	177	185	180	176	102	68	47	49	28	21
00	156	184	171	163	186	197	95	67	59	37	20	18
Hr Total	633	621	718	705	728	769	461	323	237	163	125	97

24 Hour Total : 9309  
 AM peak hour begins : 11:00 AM peak volume : 671 Peak hour factor : 0.94  
 PM peak hour begins : 17:00 PM peak volume : 769 Peak hour factor : 0.92  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217007.PRN  
 Station : 000012140901  
 Identification : 000065310001 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of CR 40

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Dec 17 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	12	3	2	3	6	17	26	53	72	46	69	93
30	13	6	8	3	5	20	33	42	67	87	74	86
45	3	1	2	4	10	23	43	65	64	64	78	103
00	2	4	7	9	9	31	47	54	59	77	77	92
Hr Total	30	14	19	19	30	91	149	214	262	274	298	374

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	88	90	76	109	94	99	89	45	34	25	19	17
30	75	88	102	71	88	88	101	49	30	33	21	13
45	83	83	89	95	86	105	58	50	23	29	22	13
00	99	96	76	93	97	127	48	35	30	20	20	11
Hr Total	345	357	343	368	365	419	296	179	117	107	82	54

24 Hour Total : 4806  
 AM peak hour begins : 11:00 AM peak volume : 374 Peak hour factor : 0.91  
 PM peak hour begins : 17:30 PM peak volume : 422 Peak hour factor : 0.83

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Dec 17 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	12	7	3	7	6	36	56	50	55	69	78	70
30	6	4	3	10	20	43	57	60	41	56	66	66
45	6	5	8	9	14	39	60	58	57	60	76	75
00	5	2	4	6	21	41	51	59	57	84	95	91
Hr Total	29	18	18	32	61	159	224	227	210	269	315	302

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	85	103	77	87	84	79	65	50	29	30	23	5
30	102	81	74	102	90	67	58	48	30	34	18	12
45	64	104	96	100	108	69	71	30	21	34	17	9
00	81	77	111	64	64	68	50	35	23	34	8	13
Hr Total	332	365	358	353	346	283	244	163	103	132	66	39

24 Hour Total : 4648  
 AM peak hour begins : 11:30 AM peak volume : 353 Peak hour factor : 0.87  
 PM peak hour begins : 14:45 PM peak volume : 400 Peak hour factor : 0.90

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217007.PRN  
 Station : 000012140901  
 Identification : 000065310001 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : US 19 south of CR 40

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Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	24	10	5	10	12	53	82	103	127	115	147	163
30	19	10	11	13	25	63	90	102	108	143	140	152
45	9	6	10	13	24	62	103	123	121	124	154	178
00	7	6	11	15	30	72	98	113	116	161	172	183
Hr Total	59	32	37	51	91	250	373	441	472	543	613	676

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	173	193	153	196	178	178	154	95	63	55	42	22
30	177	169	176	173	178	155	159	97	60	67	39	25
45	147	187	185	195	194	174	129	80	44	63	39	22
00	180	173	187	157	161	195	98	70	53	54	28	24
Hr Total	677	722	701	721	711	702	540	342	220	239	148	93

24 Hour Total : 9454  
 AM peak hour begins : 11:30 AM peak volume : 711 Peak hour factor : 0.97  
 PM peak hour begins : 14:45 PM peak volume : 751 Peak hour factor : 0.96  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215005.PRN  
 Station : 000012140902  
 Identification : 000065310009  
 Start date : Dec 15, 09  
 Stop date : Dec 15, 09  
 City/Town : Inglis  
 Location : CR 40W west of US 19  
 Interval : 15 minutes  
 Start time : 00:00  
 Stop time : 24:00  
 County : Levy

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Dec 15 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	2	1	0	0	1	3	18	21	28	33	38
30	0	0	1	1	0	1	10	24	19	27	33	29
45	2	0	2	0	1	5	9	31	30	43	44	37
00	2	1	0	3	4	3	13	47	31	44	29	46
Hr Total	6	3	4	4	5	10	35	120	101	142	139	150

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	29	31	35	34	47	46	37	26	11	10	7	3
30	45	34	47	45	37	42	28	22	15	13	6	3
45	40	44	41	46	48	40	26	24	10	12	6	5
00	41	46	57	52	54	32	26	16	16	7	5	2
Hr Total	155	155	180	177	186	160	117	88	52	42	24	13

24 Hour Total : 2068  
 AM peak hour begins : 11:30 AM peak volume : 157 Peak hour factor : 0.85  
 PM peak hour begins : 15:15 PM peak volume : 190 Peak hour factor : 0.91

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Dec 15 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	0	0	1	0	7	15	17	39	33	37	24
30	0	2	2	2	2	8	10	15	36	30	36	39
45	1	4	0	2	2	9	18	36	32	30	42	40
00	3	1	1	0	7	11	17	48	27	34	46	27
Hr Total	8	7	3	5	11	35	60	116	134	127	161	130

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	41	39	31	47	46	36	34	17	17	12	6	2
30	40	31	45	46	42	34	26	15	7	10	2	3
45	39	35	47	45	39	42	28	13	7	12	2	0
00	39	37	38	41	44	42	18	14	6	7	6	5
Hr Total	159	142	161	179	171	154	106	59	37	41	16	10

24 Hour Total : 2032  
 AM peak hour begins : 10:00 AM peak volume : 161 Peak hour factor : 0.88  
 PM peak hour begins : 15:00 PM peak volume : 179 Peak hour factor : 0.95

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215005.PRN  
 Station : 000012140902  
 Identification : 000065310009 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40W west of US 19

\*\*\*\*\*

Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	2	1	1	0	8	18	35	60	61	70	62
30	0	2	3	3	2	9	20	39	55	57	69	68
45	3	4	2	2	3	14	27	67	62	73	86	77
00	5	2	1	3	11	14	30	95	58	78	75	73
Hr Total	14	10	7	9	16	45	95	236	235	269	300	280

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	70	70	66	81	93	82	71	43	28	22	13	5
30	85	65	92	91	79	76	54	37	22	23	8	6
45	79	79	88	91	87	82	54	37	17	24	8	5
00	80	83	95	93	98	74	44	30	22	14	11	7
Hr Total	314	297	341	356	357	314	223	147	89	83	40	23

24 Hour Total : 4100  
 AM peak hour begins : 11:30 AM peak volume : 305 Peak hour factor : 0.90  
 PM peak hour begins : 15:15 PM peak volume : 368 Peak hour factor : 0.99  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216005.PRN  
 Station : 000012140902  
 Identification : 000065310009 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40W west of US 19

\*\*\*\*\*

Dec 16 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	3	1	0	0	0	2	8	15	18	24	31	38
30	1	1	0	1	2	0	5	19	32	28	30	31
45	1	2	2	0	1	1	12	38	25	31	32	37
00	0	1	1	1	5	6	10	43	22	44	35	43
Hr Total	5	5	3	2	8	9	35	115	97	127	128	149

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	38	31	26	42	45	41	33	27	12	9	15	3
30	36	27	40	52	49	38	34	19	18	12	14	4
45	32	39	40	54	41	46	22	17	10	14	2	2
00	42	42	49	46	42	35	20	20	12	13	3	3
Hr Total	148	139	155	194	177	160	109	83	52	48	34	12

24 Hour Total : 1994  
 AM peak hour begins : 11:30 AM peak volume : 154 Peak hour factor : 0.90  
 PM peak hour begins : 14:45 PM peak volume : 197 Peak hour factor : 0.91  
 \*\*\*\*\*

Dec 16 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	1	0	2	1	6	13	17	35	32	41	41
30	2	0	1	0	3	2	13	22	42	27	33	37
45	0	1	1	3	5	9	15	44	26	29	32	33
00	2	0	0	0	9	7	16	34	28	36	36	37
Hr Total	6	2	2	5	18	24	57	117	131	124	142	148

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	43	41	47	52	34	44	29	14	8	9	5	8
30	27	37	47	52	43	23	18	12	9	6	12	4
45	31	32	58	47	33	27	23	16	3	13	5	1
00	33	34	42	43	32	42	21	11	3	6	9	2
Hr Total	134	144	194	194	142	136	91	53	23	34	31	15

24 Hour Total : 1967  
 AM peak hour begins : 07:30 AM peak volume : 155 Peak hour factor : 0.88  
 PM peak hour begins : 14:30 PM peak volume : 204 Peak hour factor : 0.88  
 \*\*\*\*\*

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1216005.PRN  
 Station : 000012140902  
 Identification : 000065310009 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40W west of US 19

\*\*\*\*\*

Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	5	2	0	2	1	8	21	32	53	56	72	79
30	3	1	1	1	5	2	18	41	74	55	63	68
45	1	3	3	3	6	10	27	82	51	60	64	70
00	2	1	1	1	14	13	26	77	50	80	71	80
Hr Total	11	7	5	7	26	33	92	232	228	251	270	297

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	81	72	73	94	79	85	62	41	20	18	20	11
30	63	64	87	104	92	61	52	31	27	18	26	8
45	63	71	98	101	74	73	45	33	13	27	7	3
00	75	76	91	89	74	77	41	31	15	19	12	5
Hr Total	282	283	349	388	319	296	200	136	75	82	65	27

24 Hour Total : 3961  
 AM peak hour begins : 11:15 AM peak volume : 299 Peak hour factor : 0.92  
 PM peak hour begins : 14:45 PM peak volume : 390 Peak hour factor : 0.94  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217005.PRN  
 Station : 000012140902  
 Identification : 000065310009 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40W west of US 19

\*\*\*\*\*

Dec 17 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	5	1	0	0	0	1	15	17	24	37	30
30	2	2	1	1	2	0	8	17	23	35	34	38
45	3	2	0	1	2	5	7	42	20	32	37	27
00	1	3	0	2	4	3	9	34	29	31	34	34
Hr Total	8	12	2	4	8	8	25	108	89	122	142	129

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	41	39	48	52	36	40	42	16	18	8	7	2
30	40	43	52	31	49	32	41	19	11	12	9	7
45	45	44	38	47	40	26	32	26	13	13	4	8
00	52	37	46	41	42	55	21	12	10	10	7	2
Hr Total	178	163	184	171	167	153	136	73	52	43	27	19

24 Hour Total : 2023  
 AM peak hour begins : 10:00 AM peak volume : 142 Peak hour factor : 0.96  
 PM peak hour begins : 14:15 PM peak volume : 188 Peak hour factor : 0.90

\*\*\*\*\*

Dec 17 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	1	0	2	0	5	12	14	30	36	40	36
30	5	0	0	1	5	5	13	18	27	38	36	38
45	1	1	1	2	3	6	17	31	23	38	41	22
00	1	1	0	0	6	8	18	40	28	34	34	42
Hr Total	11	3	1	5	14	24	60	103	108	146	151	138

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	40	34	50	52	47	28	38	18	16	7	7	4
30	43	36	38	49	34	32	19	13	13	15	6	4
45	28	40	47	48	34	35	14	10	6	15	4	6
00	31	30	39	31	30	19	10	15	8	6	3	3
Hr Total	142	140	174	180	145	114	81	56	43	43	20	17

24 Hour Total : 1919  
 AM peak hour begins : 09:45 AM peak volume : 151 Peak hour factor : 0.92  
 PM peak hour begins : 14:45 PM peak volume : 188 Peak hour factor : 0.90

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1217005.PRN  
 Station : 000012140902  
 Identification : 000065310009 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40W west of US 19

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Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	6	1	2	0	5	13	29	47	60	77	66
30	7	2	1	2	7	5	21	35	50	73	70	76
45	4	3	1	3	5	11	24	73	43	70	78	49
00	2	4	0	2	10	11	27	74	57	65	68	76
Hr Total	19	15	3	9	22	32	85	211	197	268	293	267

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	81	73	98	104	83	68	80	34	34	15	14	6
30	83	79	90	80	83	64	60	32	24	27	15	11
45	73	84	85	95	74	61	46	36	19	28	8	14
00	83	67	85	72	72	74	31	27	18	16	10	5
Hr Total	320	303	358	351	312	267	217	129	95	86	47	36

24 Hour Total : 3942  
 AM peak hour begins : 10:00 AM peak volume : 293 Peak hour factor : 0.94  
 PM peak hour begins : 14:15 PM peak volume : 364 Peak hour factor : 0.88  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215006.PRN  
 Station : 000012140903  
 Identification : 000065310010 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40E east of US 19

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Dec 15 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	0	0	0	4	3	19	25	23	36	20	27
30	0	0	1	0	9	13	26	36	39	32	27	39
45	1	0	3	0	2	13	21	38	41	31	34	31
00	2	0	0	1	7	21	19	41	30	25	27	31
Hr Total	5	0	4	1	22	50	85	140	133	124	108	128

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	24	39	34	37	35	22	30	15	5	7	5	2
30	30	41	49	33	43	28	26	9	11	7	3	2
45	37	28	34	30	34	26	21	12	8	8	6	2
00	26	34	35	34	39	23	22	13	6	12	4	2
Hr Total	117	142	152	134	151	99	99	49	30	34	18	8

24 Hour Total : 1833  
 AM peak hour begins : 08:15 AM peak volume : 146 Peak hour factor : 0.89  
 PM peak hour begins : 14:15 PM peak volume : 155 Peak hour factor : 0.79

\*\*\*\*\*

Dec 15 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	0	1	0	0	7	9	11	22	21	22	34
30	0	2	0	1	0	3	12	12	24	18	31	29
45	2	2	0	1	0	9	10	17	20	25	21	33
00	1	0	1	1	3	4	17	28	23	29	29	31
Hr Total	7	4	2	3	3	23	48	68	89	93	103	127

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	32	47	31	48	44	46	32	24	14	6	9	4
30	34	23	39	50	38	54	21	19	16	9	10	1
45	39	38	37	29	43	55	27	12	11	11	6	4
00	42	43	35	38	54	50	18	13	9	9	3	4
Hr Total	147	151	142	165	179	205	98	68	50	35	28	13

24 Hour Total : 1851  
 AM peak hour begins : 11:30 AM peak volume : 130 Peak hour factor : 0.83  
 PM peak hour begins : 16:45 PM peak volume : 209 Peak hour factor : 0.95

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215006.PRN  
 Station : 000012140903  
 Identification : 000065310010 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40E east of US 19

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Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	6	0	1	0	4	10	28	36	45	57	42	61
30	0	2	1	1	9	16	38	48	63	50	58	68
45	3	2	3	1	2	22	31	55	61	56	55	64
00	3	0	1	2	10	25	36	69	53	54	56	62
Hr Total	12	4	6	4	25	73	133	208	222	217	211	255

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	56	86	65	85	79	68	62	39	19	13	14	6
30	64	64	88	83	81	82	47	28	27	16	13	3
45	76	66	71	59	77	81	48	24	19	19	12	6
00	68	77	70	72	93	73	40	26	15	21	7	6
Hr Total	264	293	294	299	330	304	197	117	80	69	46	21

24 Hour Total : 3684  
 AM peak hour begins : 11:00 AM peak volume : 255 Peak hour factor : 0.94  
 PM peak hour begins : 16:00 PM peak volume : 330 Peak hour factor : 0.89  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216006.PRN  
 Station : 000012140903  
 Identification : 000065310010 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40E east of US 19

\*\*\*\*\*

Dec 16 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	3	1	0	0	3	7	16	26	28	30	31	37
30	1	1	1	1	6	12	21	28	28	32	22	21
45	0	0	2	0	6	19	20	42	25	29	32	30
00	0	0	0	1	9	15	21	22	30	42	33	23
Hr Total	4	2	3	2	24	53	78	118	111	133	118	111

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	36	32	29	39	28	31	23	11	11	10	7	4
30	20	31	35	34	28	24	29	17	24	8	6	6
45	33	34	31	32	31	33	9	10	15	11	3	5
00	34	37	30	25	22	34	25	11	9	7	3	3
Hr Total	123	134	125	130	109	122	86	49	59	36	19	18

24 Hour Total : 1767  
 AM peak hour begins : 09:15 AM peak volume : 134 Peak hour factor : 0.80  
 PM peak hour begins : 13:30 PM peak volume : 135 Peak hour factor : 0.91

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Dec 16 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	1	0	2	1	1	7	9	20	30	27	22
30	1	0	0	0	0	2	7	10	27	25	28	37
45	3	1	1	0	2	1	11	13	25	35	30	34
00	1	0	3	1	6	5	14	26	14	29	31	30
Hr Total	7	2	4	3	9	9	39	58	86	119	116	123

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	29	32	35	40	38	42	44	11	11	15	6	8
30	31	29	43	41	47	53	19	15	7	6	5	2
45	37	21	36	39	38	49	29	19	13	10	3	1
00	29	33	47	31	59	41	20	14	17	7	5	1
Hr Total	126	115	161	151	182	185	112	59	48	38	19	12

24 Hour Total : 1783  
 AM peak hour begins : 11:15 AM peak volume : 130 Peak hour factor : 0.88  
 PM peak hour begins : 16:45 PM peak volume : 203 Peak hour factor : 0.86

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216006.PRN  
 Station : 000012140903  
 Identification : 000065310010 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40E east of US 19

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Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	5	2	0	2	4	8	23	35	48	60	58	59
30	2	1	1	1	6	14	28	38	55	57	50	58
45	3	1	3	0	8	20	31	55	50	64	62	64
00	1	0	3	2	15	20	35	48	44	71	64	53
Hr Total	11	4	7	5	33	62	117	176	197	252	234	234

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	65	64	64	79	66	73	67	22	22	25	13	12
30	51	60	78	75	75	77	48	32	31	14	11	8
45	70	55	67	71	69	82	38	29	28	21	6	6
00	63	70	77	56	81	75	45	25	26	14	8	4
Hr Total	249	249	286	281	291	307	198	108	107	74	38	30

24 Hour Total : 3550  
 AM peak hour begins : 09:00 AM peak volume : 252 Peak hour factor : 0.89  
 PM peak hour begins : 16:45 PM peak volume : 313 Peak hour factor : 0.95  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217006.PRN  
 Station : 000012140903  
 Identification : 000065310010 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 40E east of US 19

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Dec 17 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	1	0	0	1	6	18	17	23	25	34	25
30	0	2	0	0	4	9	24	42	19	29	27	31
45	1	1	1	2	6	15	19	33	27	37	39	29
00	2	2	1	1	9	16	21	28	33	35	37	28
Hr Total	4	6	2	3	20	46	82	120	102	126	137	113

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	43	31	34	28	29	30	29	22	12	6	4	4
30	35	34	37	43	28	30	33	19	11	10	2	8
45	35	38	20	37	30	15	19	16	8	6	2	2
00	44	39	43	25	39	31	20	10	12	14	3	2
Hr Total	157	142	134	133	126	106	101	67	43	36	11	16

24 Hour Total : 1833  
 AM peak hour begins : 10:00 AM peak volume : 137 Peak hour factor : 0.88  
 PM peak hour begins : 12:00 PM peak volume : 157 Peak hour factor : 0.89

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Dec 17 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	3	2	0	0	1	2	7	11	32	23	38	36
30	1	1	2	0	0	4	8	11	19	27	26	26
45	1	0	0	0	2	5	12	10	19	24	23	40
00	2	0	0	1	2	6	18	26	19	30	27	34
Hr Total	7	3	2	1	5	17	45	58	89	104	114	136

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	30	32	46	57	42	25	36	18	18	8	9	8
30	46	38	36	52	45	44	41	11	8	15	11	9
45	42	36	47	27	39	40	17	19	7	14	4	5
00	27	37	29	50	35	35	12	16	8	9	7	3
Hr Total	145	143	158	186	161	144	106	64	41	46	31	25

24 Hour Total : 1831  
 AM peak hour begins : 11:30 AM peak volume : 150 Peak hour factor : 0.82  
 PM peak hour begins : 15:00 PM peak volume : 186 Peak hour factor : 0.82

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217006.PRN  
 Station : 000012140903  
 Identification : 000065310010  
 Start date : Dec 17, 09  
 Stop date : Dec 17, 09  
 City/Town : Inglis  
 Location : CR 40E east of US 19  
 Interval : 15 minutes  
 Start time : 00:00  
 Stop time : 24:00  
 County : Levy

\*\*\*\*\*

Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	3	0	0	2	8	25	28	55	48	72	61
30	1	3	2	0	4	13	32	53	38	56	53	57
45	2	1	1	2	8	20	31	43	46	61	62	69
00	4	2	1	2	11	22	39	54	52	65	64	62
Hr Total	11	9	4	4	25	63	127	178	191	230	251	249

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	73	63	80	85	71	55	65	40	30	14	13	12
30	81	72	73	95	73	74	74	30	19	25	13	17
45	77	74	67	64	69	55	36	35	15	20	6	7
00	71	76	72	75	74	66	32	26	20	23	10	5
Hr Total	302	285	292	319	287	250	207	131	84	82	42	41

24 Hour Total : 3664  
 AM peak hour begins : 11:30 AM peak volume : 285 Peak hour factor : 0.88  
 PM peak hour begins : 14:30 PM peak volume : 319 Peak hour factor : 0.84  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215001.PRN  
 Station : 000012140906  
 Identification : 000145150009 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : SR 121 north of CR 336/US 19

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Dec 15 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	1	1	1	1	5	7	12	11	19	13	18
30	2	0	3	2	5	4	17	5	15	18	16	18
45	0	0	2	3	4	8	17	17	11	22	15	14
00	3	0	0	0	7	7	17	6	13	13	5	16
Hr Total	9	1	6	6	17	24	58	40	50	72	49	66

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	14	9	15	23	14	12	23	7	4	5	3	1
30	10	10	14	14	17	16	17	7	6	3	2	4
45	10	12	9	22	20	17	8	6	5	2	9	0
00	14	12	13	16	10	19	9	4	6	1	4	0
Hr Total	48	43	51	75	61	64	57	24	21	11	18	5

24 Hour Total : 876  
 AM peak hour begins : 08:45 AM peak volume : 72 Peak hour factor : 0.82  
 PM peak hour begins : 17:30 PM peak volume : 76 Peak hour factor : 0.83

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Dec 15 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	3	0	1	6	13	12	17	6	22	10	6
30	0	0	3	3	2	7	14	19	14	7	11	10
45	3	0	1	1	4	13	15	19	14	11	19	13
00	1	1	0	1	9	9	7	19	26	9	17	14
Hr Total	4	4	4	6	21	42	48	74	60	49	57	43

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	18	5	22	6	17	19	9	5	12	1	1	1
30	16	15	13	11	19	17	13	5	5	3	1	2
45	7	12	11	10	13	15	11	8	5	2	2	0
00	15	16	11	17	21	12	21	5	3	4	4	0
Hr Total	56	48	57	44	70	63	54	23	25	10	8	3

24 Hour Total : 873  
 AM peak hour begins : 08:15 AM peak volume : 76 Peak hour factor : 0.73  
 PM peak hour begins : 16:15 PM peak volume : 72 Peak hour factor : 0.86

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215001.PRN  
 Station : 000012140906  
 Identification : 000145150009 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : SR 121 north of CR 336/US 19

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Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	4	4	1	2	7	18	19	29	17	41	23	24
30	2	0	6	5	7	11	31	24	29	25	27	28
45	3	0	3	4	8	21	32	36	25	33	34	27
00	4	1	0	1	16	16	24	25	39	22	22	30
Hr Total	13	5	10	12	38	66	106	114	110	121	106	109

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	32	14	37	29	31	31	32	12	16	6	4	2
30	26	25	27	25	36	33	30	12	11	6	3	6
45	17	24	20	32	33	32	19	14	10	4	11	0
00	29	28	24	33	31	31	30	9	9	5	8	0
Hr Total	104	91	108	119	131	127	111	47	46	21	26	8

24 Hour Total : 1749  
 AM peak hour begins : 08:45 AM peak volume : 138 Peak hour factor : 0.84  
 PM peak hour begins : 15:45 PM peak volume : 133 Peak hour factor : 0.92  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216001.PRN  
 Station : 000012140906  
 Identification : 000145150009  
 Start date : Dec 16, 09  
 Stop date : Dec 16, 09  
 City/Town : Inglis  
 Location : SR 121 north of CR 336/US 19  
 Interval : 15 minutes  
 Start time : 00:00  
 Stop time : 24:00  
 County : Levy

Dec 16 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	0	0	4	1	9	10	9	11	17	18	16
30	4	1	0	1	4	5	11	13	20	16	11	12
45	0	0	2	3	2	2	10	7	18	21	25	16
00	1	0	0	0	5	2	9	10	20	13	7	9
Hr Total	6	1	2	8	12	18	40	39	69	67	61	53

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	13	12	24	10	18	10	23	6	4	1	2	2
30	16	12	14	22	13	22	8	6	4	5	0	4
45	9	2	17	15	15	24	10	7	2	5	5	1
00	20	12	17	22	12	10	12	6	3	1	3	0
Hr Total	58	38	72	69	58	66	53	25	13	12	10	7

24 Hour Total : 857  
 AM peak hour begins : 08:15 AM peak volume : 75 Peak hour factor : 0.94  
 PM peak hour begins : 17:15 PM peak volume : 79 Peak hour factor : 0.82

Dec 16 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	0	0	0	1	3	12	14	10	12	12	25
30	1	1	1	2	1	12	25	19	16	11	13	15
45	1	3	3	3	3	12	16	18	7	16	12	12
00	1	1	2	0	10	12	14	14	15	10	12	12
Hr Total	4	5	6	5	15	39	67	65	48	49	49	64

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	12	10	9	12	17	15	8	5	6	2	4	4
30	12	12	17	6	13	25	4	5	3	3	1	3
45	5	11	12	16	14	9	10	9	1	5	3	4
00	6	14	14	19	12	8	12	3	1	6	0	0
Hr Total	35	47	52	53	56	57	34	22	11	16	8	11

24 Hour Total : 818  
 AM peak hour begins : 06:15 AM peak volume : 69 Peak hour factor : 0.69  
 PM peak hour begins : 16:30 PM peak volume : 66 Peak hour factor : 0.66

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1216001.PRN  
 Station : 000012140906  
 Identification : 000145150009 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : SR 121 north of CR 336/US 19

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Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	0	0	4	2	12	22	23	21	29	30	41
30	5	2	1	3	5	17	36	32	36	27	24	27
45	1	3	5	6	5	14	26	25	25	37	37	28
00	2	1	2	0	15	14	23	24	35	23	19	21
Hr Total	10	6	8	13	27	57	107	104	117	116	110	117

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	25	22	33	22	35	25	31	11	10	3	6	6
30	28	24	31	28	26	47	12	11	7	8	1	7
45	14	13	29	31	29	33	20	16	3	10	8	5
00	26	26	31	41	24	18	24	9	4	7	3	0
Hr Total	93	85	124	122	114	123	87	47	24	28	18	18

24 Hour Total : 1675  
 AM peak hour begins : 08:45 AM peak volume : 128 Peak hour factor : 0.86  
 PM peak hour begins : 15:15 PM peak volume : 135 Peak hour factor : 0.82

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1217001.PRN  
 Station : 000012140906  
 Identification : 000145150009 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : SR 121 north of CR 336/US 19

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Dec 17 Northbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	0	0	1	4	5	12	8	9	16	10	20
30	1	0	0	1	1	5	15	11	13	19	11	16
45	2	1	4	0	0	7	14	19	16	13	17	20
00	1	0	2	0	4	10	8	9	18	12	16	19
Hr Total	5	1	6	2	9	27	49	47	56	60	54	75

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	18	18	10	19	22	19	15	3	11	1	3	1
30	16	17	12	8	21	12	9	3	3	4	1	6
45	12	15	6	23	20	18	18	6	5	6	3	2
00	11	18	11	21	14	23	10	7	5	1	4	1
Hr Total	57	68	39	71	77	72	52	19	24	12	11	10

24 Hour Total : 903  
 AM peak hour begins : 11:00 AM peak volume : 75 Peak hour factor : 0.94  
 PM peak hour begins : 15:30 PM peak volume : 87 Peak hour factor : 0.95

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Dec 17 Southbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	1	1	0	6	14	11	15	9	11	8	13
30	1	0	1	0	1	6	15	20	11	8	12	9
45	1	0	4	1	3	9	8	14	9	17	9	9
00	4	0	5	2	13	9	10	13	15	10	12	18
Hr Total	6	1	11	3	23	38	44	62	44	46	41	49

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	21	6	10	22	21	18	10	8	6	9	1	1
30	12	14	8	16	19	20	10	9	6	8	1	0
45	17	16	19	12	17	10	9	4	4	3	8	0
00	16	13	12	8	15	13	10	8	4	5	2	1
Hr Total	66	49	49	58	72	61	39	29	20	25	12	2

24 Hour Total : 850  
 AM peak hour begins : 07:00 AM peak volume : 62 Peak hour factor : 0.77  
 PM peak hour begins : 16:00 PM peak volume : 72 Peak hour factor : 0.86

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1217001.PRN  
 Station : 000012140906  
 Identification : 000145150009 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : SR 121 north of CR 336/US 19

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Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	1	1	1	10	19	23	23	18	27	18	33
30	2	0	1	1	2	11	30	31	24	27	23	25
45	3	1	8	1	3	16	22	33	25	30	26	29
00	5	0	7	2	17	19	18	22	33	22	28	37
Hr Total	11	2	17	5	32	65	93	109	100	106	95	124

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	39	24	20	41	43	37	25	11	17	10	4	2
30	28	31	20	24	40	32	19	12	9	12	2	6
45	29	31	25	35	37	28	27	10	9	9	11	2
00	27	31	23	29	29	36	20	15	9	6	6	2
Hr Total	123	117	88	129	149	133	91	48	44	37	23	12

24 Hour Total : 1753  
 AM peak hour begins : 11:30 AM peak volume : 133 Peak hour factor : 0.85  
 PM peak hour begins : 15:45 PM peak volume : 149 Peak hour factor : 0.87  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

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Data File : D1215003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 15 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	3	0	0	0	1	7	2	3	6	4
30	0	0	0	0	1	2	3	7	3	2	5	5
45	0	0	0	0	0	1	1	6	4	0	6	6
00	0	0	0	0	2	3	5	2	4	6	1	1
Hr Total	0	0	3	0	3	6	10	22	13	11	18	16

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	4	4	0	8	2	6	2	3	0	0	1	0
30	2	2	3	8	7	3	1	2	0	3	2	0
45	5	4	5	5	9	9	2	1	1	0	1	1
00	4	3	1	7	3	4	1	0	0	2	1	0
Hr Total	15	13	9	28	21	22	6	6	1	5	5	1

24 Hour Total : 234  
 AM peak hour begins : 06:45 AM peak volume : 25 Peak hour factor : 0.89  
 PM peak hour begins : 15:00 PM peak volume : 28 Peak hour factor : 0.88

\*\*\*\*\*

Dec 15 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	0	0	0	0	0	2	2	3	4	6	4
30	1	1	0	0	0	2	3	3	12	3	1	3
45	0	0	0	0	0	2	3	2	1	4	4	6
00	0	0	0	0	0	2	4	8	0	2	2	2
Hr Total	3	1	0	0	0	6	12	15	16	13	13	15

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	3	4	7	4	2	2	5	1	0	1	0	3
30	2	4	5	1	3	9	5	4	0	1	1	0
45	7	9	5	7	6	9	5	0	0	2	0	0
00	2	3	4	7	2	2	3	2	2	0	1	0
Hr Total	14	20	21	19	13	22	18	7	2	4	2	3

24 Hour Total : 239  
 AM peak hour begins : 07:30 AM peak volume : 25 Peak hour factor : 0.52  
 PM peak hour begins : 17:15 PM peak volume : 25 Peak hour factor : 0.69

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1215003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	0	3	0	0	0	3	9	5	7	12	8
30	1	1	0	0	1	4	6	10	15	5	6	8
45	0	0	0	0	0	3	4	8	5	4	10	12
00	0	0	0	0	2	5	9	10	4	8	3	3
Hr Total	3	1	3	0	3	12	22	37	29	24	31	31

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	7	8	7	12	4	8	7	4	0	1	1	3
30	4	6	8	9	10	12	6	6	0	4	3	0
45	12	13	10	12	15	18	7	1	1	2	1	1
00	6	6	5	14	5	6	4	2	2	2	2	0
Hr Total	29	33	30	47	34	44	24	13	3	9	7	4

24 Hour Total : 473  
 AM peak hour begins : 07:30 AM peak volume : 38 Peak hour factor : 0.63  
 PM peak hour begins : 15:00 PM peak volume : 47 Peak hour factor : 0.84

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1216003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 16 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	0	0	0	1	4	5	2	4	3	2
30	0	0	0	0	2	2	5	11	1	5	9	4
45	0	0	1	1	3	3	1	7	4	5	6	4
00	0	0	0	5	1	1	3	7	4	2	7	2
Hr Total	0	0	1	6	6	7	13	30	11	16	25	12

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	2	5	5	5	2	7	3	2	1	1	0	0
30	2	3	4	6	0	4	5	1	0	0	1	1
45	7	0	2	10	8	3	0	4	1	1	0	0
00	4	8	5	4	6	3	1	1	1	2	2	0
Hr Total	15	16	16	25	16	17	9	8	3	4	3	1

24 Hour Total : 260  
 AM peak hour begins : 07:00 AM peak volume : 30 Peak hour factor : 0.68  
 PM peak hour begins : 14:45 PM peak volume : 26 Peak hour factor : 0.65

\*\*\*\*\*

Dec 16 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	1	0	0	0	2	4	0	2	2	4
30	2	1	1	0	0	0	2	0	4	0	1	4
45	0	0	0	0	0	0	4	7	5	4	0	1
00	0	0	0	0	0	2	4	3	9	4	3	8
Hr Total	2	1	2	0	0	2	12	14	18	10	6	17

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	4	10	2	3	1	7	10	5	0	0	0	0
30	8	2	2	3	6	7	5	4	1	1	1	1
45	4	4	3	9	6	8	2	1	1	3	2	1
00	1	3	5	7	8	0	1	1	0	1	0	0
Hr Total	17	19	12	22	21	22	18	11	2	5	3	2

24 Hour Total : 238  
 AM peak hour begins : 11:30 AM peak volume : 21 Peak hour factor : 0.66  
 PM peak hour begins : 16:45 PM peak volume : 30 Peak hour factor : 0.94

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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1216003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 16, 09 Start time : 00:00  
 Stop date : Dec 16, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 16 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	1	0	0	1	6	9	2	6	5	6
30	2	1	1	0	2	2	7	11	5	5	10	8
45	0	0	1	1	3	3	5	14	9	9	6	5
00	0	0	0	5	1	3	7	10	13	6	10	10
Hr Total	2	1	3	6	6	9	25	44	29	26	31	29

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	6	15	7	8	3	14	13	7	1	1	0	0
30	10	5	6	9	6	11	10	5	1	1	2	2
45	11	4	5	19	14	11	2	5	2	4	2	1
00	5	11	10	11	14	3	2	2	1	3	2	0
Hr Total	32	35	28	47	37	39	27	19	5	9	6	3

24 Hour Total : 498  
 AM peak hour begins : 07:00 AM peak volume : 44 Peak hour factor : 0.79  
 PM peak hour begins : 16:30 PM peak volume : 53 Peak hour factor : 0.95  
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Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1217003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 17 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	0	0	0	0	1	6	7	4	4	7	4
30	2	0	0	0	0	1	1	9	2	3	2	5
45	0	0	0	3	0	3	2	9	6	7	3	2
00	0	1	0	0	1	3	0	5	10	5	3	2
Hr Total	3	1	0	3	1	8	9	30	22	19	15	13

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	4	4	5	7	1	2	6	1	3	0	0	0
30	4	8	4	3	3	4	3	1	1	1	2	0
45	4	0	6	5	4	4	6	0	1	0	0	2
00	3	2	3	2	2	2	0	2	1	0	0	0
Hr Total	15	14	18	17	10	12	15	4	6	1	2	2

24 Hour Total : 240  
 AM peak hour begins : 07:00 AM peak volume : 30 Peak hour factor : 0.83  
 PM peak hour begins : 14:15 PM peak volume : 20 Peak hour factor : 0.71

\*\*\*\*\*

Dec 17 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	0	0	0	0	4	2	3	4	3	7
30	3	0	0	0	0	0	0	5	3	1	1	3
45	0	0	0	0	3	1	0	6	3	6	4	4
00	1	1	0	0	1	2	8	3	3	3	10	4
Hr Total	4	1	0	0	4	3	12	16	12	14	18	18

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	4	3	6	6	9	5	5	6	1	2	1	0
30	3	5	7	4	3	6	5	2	2	2	1	1
45	4	11	2	6	5	2	2	1	2	0	0	1
00	0	2	2	5	8	10	3	2	1	0	0	0
Hr Total	11	21	17	21	25	23	15	11	6	4	2	2

24 Hour Total : 260  
 AM peak hour begins : 10:30 AM peak volume : 24 Peak hour factor : 0.60  
 PM peak hour begins : 13:30 PM peak volume : 26 Peak hour factor : 0.59

\*\*\*\*\*

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1217003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 17, 09 Start time : 00:00  
 Stop date : Dec 17, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 17 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	1	0	0	0	0	1	10	9	7	8	10	11
30	5	0	0	0	0	1	1	14	5	4	3	8
45	0	0	0	3	3	4	2	15	9	13	7	6
00	1	2	0	0	2	5	8	8	13	8	13	6
Hr Total	7	2	0	3	5	11	21	46	34	33	33	31

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	8	7	11	13	10	7	11	7	4	2	1	0
30	7	13	11	7	6	10	8	3	3	3	3	1
45	8	11	8	11	9	6	8	1	3	0	0	3
00	3	4	5	7	10	12	3	4	2	0	0	0
Hr Total	26	35	35	38	35	35	30	15	12	5	4	4

24 Hour Total : 500  
 AM peak hour begins : 06:45 AM peak volume : 46 Peak hour factor : 0.77  
 PM peak hour begins : 13:15 PM peak volume : 39 Peak hour factor : 0.75

\*\*\*\*\*

TURNING MOVEMENT COUNTS



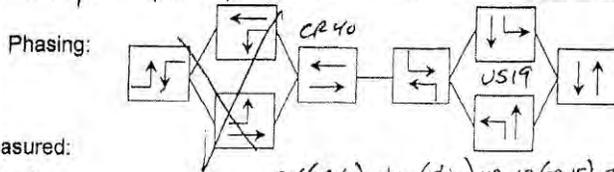


Adams Traffic, Inc.  
 P.O. Box 997  
 Plant City, FL 33564  
 Tel: (813) 763-7783 Fax: (813) 659-8688

Project No: 09091

**Turning Movement Count  
 Field Data Sheet**

Date: 12/15/09 Count Times: 7-9am & 4-6pm  
 Major Street: US 19 Direction: N-S Speed Limit: 45 mph  
 Minor Street: CR 40 / Follow That Dream Direction: E-W Speed Limit: 35 mph  
 City/County: Inglis / Levy Weather: Clear

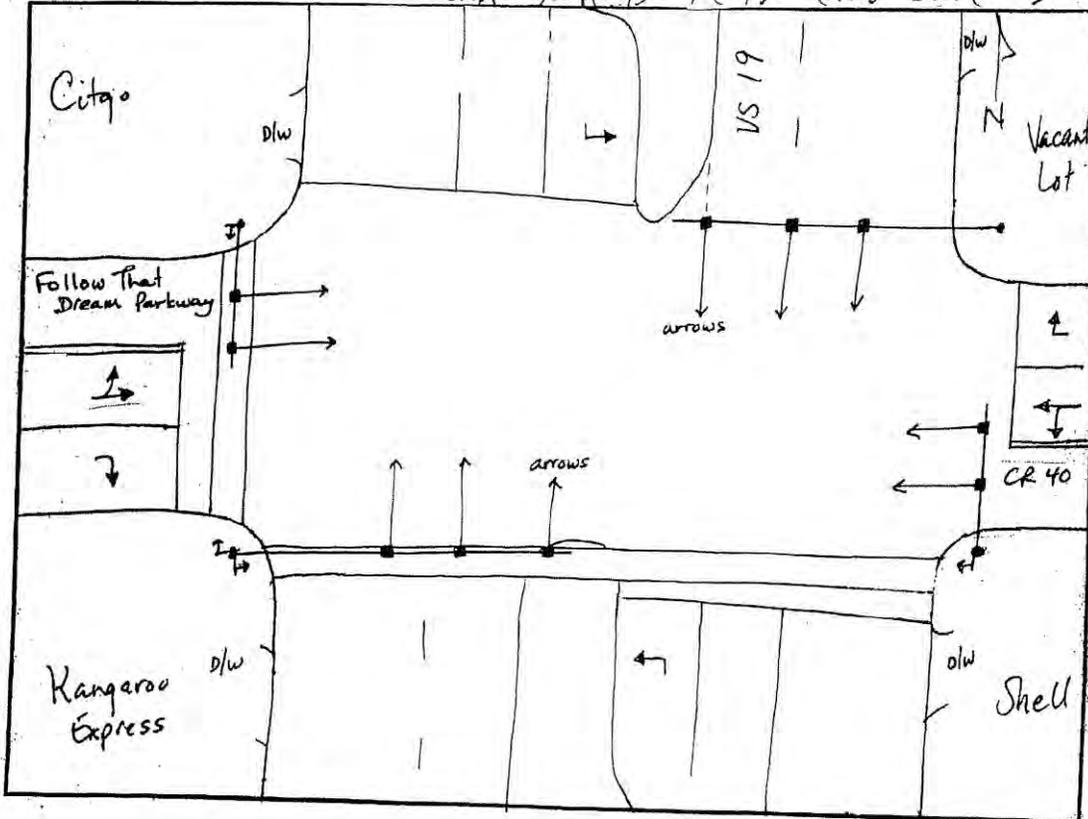


3 Cycles Measured:

AM (PM)

24(24) skip(skip) NB-17(SB-15) 22(38) - 63s. (77s.)  
 23(17) skip(skip) SB-14(SB-15) 27(19) - 64s. (51s.)  
 skip(14) skip(skip) NB-18(skip) 41(96) - 59s. (110s.)

Intersection Sketch





Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : us19&cr40  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 2

Start Time	US 19 Southbound					CR 40 Westbound					US 19 Northbound					FOLLOW THAT DREAM PARKWAY (CR 40) Eastbound					Int. Total
	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																					
By Approach 07:15 AM						07:00 AM					08:00 AM					07:30 AM					
Volume	8	128	6	6	148	53	74	8	17	152	41	165	8	5	219	9	48	35	37	129	
Percent	5.4	86.5	4.1	4.1	34.9	34.9	48.7	5.3	11.2	18.7	75.3	3.7	2.3	7.0	37.2	7.0	37.2	27.1	28.7	28.7	
High Int. 07:15 AM						07:30 AM					08:45 AM					07:45 AM					
Volume	2	37	3	1	43	16	26	1	4	47	13	48	3	2	66	4	19	8	9	40	
Peak Factor	0.860					0.809					0.830					0.806					0.806
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection 04:30 PM						04:45 PM					05:15 PM					04:30 PM					
Volume	45	216	11	10	282	53	56	17	26	152	111	202	41	36	390	13	65	30	43	151	
Percent	16.0	76.6	3.9	3.5	34.9	36.8	11.2	17.1	8	25	54	15	10	9.2	28.5	51.8	10.5	19.9	28.5	41	
05:15 Volume	12	66	5	2	85	13	5	4	8	30	25	54	15	10	104	4	20	7	10	41	
Peak Factor	0.829					0.864					0.938					0.938					0.938
High Int. 05:15 PM						04:45 PM					05:15 PM					04:30 PM					
Volume	12	66	5	2	85	14	23	5	2	44	25	54	15	10	104	3	20	12	15	50	
Peak Factor	0.829					0.864					0.938					0.938					0.755
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
By Approach 04:30 PM						04:15 PM					04:30 PM					04:00 PM					
Volume	45	216	11	10	282	52	70	16	25	163	111	202	41	36	390	7	75	26	46	154	
Percent	16.0	76.6	3.9	3.5	31.9	42.9	9.8	15.3		28.5	51.8	10.5	9.2	4.5	48.7	4.5	48.7	16.9	29.9	29.9	
High Int. 05:15 PM						04:45 PM					05:15 PM					04:30 PM					
Volume	12	66	5	2	85	14	23	5	2	44	25	54	15	10	104	3	20	12	15	50	
Peak Factor	0.829					0.926					0.938					0.770					0.770

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : us19&cr40  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	US 19 Southbound						CR 40 Westbound						US 19 Northbound						FOLLOW THAT DREAM PARKWAY (CR 40) Eastbound					
	Left	Thru	Right	RTOR	App. Total	Int. Total	Left	Thru	Right	RTOR	App. Total	Int. Total	Left	Thru	Right	RTOR	App. Total	Int. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
	07:00 AM	1	3	0	0	4	0	1	0	1	0	2	1	4	0	0	0	0	5	0	0	1	0	1
07:15 AM	0	4	0	0	4	0	1	0	0	1	1	3	0	0	0	0	4	0	0	0	0	0	0	9
07:30 AM	0	2	0	0	2	0	1	2	0	0	3	0	2	1	0	0	3	0	0	0	0	0	0	8
07:45 AM	0	4	0	0	4	0	0	0	0	0	0	5	0	0	0	0	5	1	2	1	0	4	13	
Total	1	13	0	0	14	0	1	4	0	1	6	2	14	1	0	0	17	1	2	2	0	5	42	
08:00 AM	0	4	0	0	4	0	0	0	0	0	1	0	4	0	0	0	4	0	1	0	0	1	10	
08:15 AM	1	2	0	0	3	0	1	0	0	1	1	2	0	0	0	2	0	0	0	0	2	2	8	
08:30 AM	0	6	1	0	7	0	1	0	0	1	0	6	0	0	0	6	0	0	0	0	1	0	15	
08:45 AM	1	3	0	0	4	0	0	0	1	1	1	0	6	0	0	6	0	0	0	0	0	0	11	
Total	2	15	1	0	18	0	1	1	0	1	4	0	18	0	0	0	18	0	1	1	2	4	44	

\*\*\* BREAK \*\*\*

04:00 PM	0	5	0	0	5	0	1	0	1	0	2	0	4	0	0	0	4	0	0	0	0	0	0	11
04:15 PM	0	5	1	0	6	0	0	0	0	0	0	4	0	0	0	4	1	1	0	0	0	0	2	12
04:30 PM	1	3	0	0	4	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2	8
04:45 PM	0	5	1	0	6	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	1	8
Total	1	18	2	0	21	0	1	0	1	0	2	2	8	0	1	11	1	4	0	0	0	0	5	39
05:00 PM	0	1	0	0	1	0	0	0	0	0	1	1	2	0	0	3	0	1	0	0	0	0	1	6
05:15 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	1	2	0	0	3	0	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	0	7
05:45 PM	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	3
Total	1	6	0	0	7	0	1	0	1	0	2	2	5	1	0	8	0	1	0	0	0	0	1	18
Grand Total	5	52	3	0	60	0	5	5	2	2	14	6	45	2	1	54	2	8	3	2	15	15	143	
Approch %	8.3	86.7	5.0	0.0	35.7	35.7	14.3	14.3	11.1	83.3	3.7	1.9	13.3	53.3	20.0	13.3	1.4	5.6	2.1	1.4	10.5	10.5		
Total %	3.5	36.4	2.1	0.0	3.5	3.5	1.4	1.4	4.2	31.5	1.4	0.7	37.8	1.4	5.6	2.1	1.4	10.5	10.5	10.5	10.5	10.5		

Start Time	US 19 Southbound						CR 40 Westbound						US 19 Northbound						FOLLOW THAT DREAM PARKWAY (CR 40) Eastbound					
	Left	Thru	Right	RTOR	App. Total	Int. Total	Left	Thru	Right	RTOR	App. Total	Int. Total	Left	Thru	Right	RTOR	App. Total	Int. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
	07:00 AM to 08:45 AM - Peak 1 of 1	1	16	1	0	18	0	2	1	0	0	3	0	17	0	0	17	0	0	0	0	2	2	8
Volume	1	16	1	0	18	0	2	1	0	0	3	0	17	0	0	17	0	0	0	0	2	2	8	46
Percent	5.6	88.9	5.6	0.0	66.7	66.7	33.3	0.0	0.0	0.0	1.1	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	15	
Peak Factor	0	6	1	0	7	0	0	1	0	0	1	0	6	0	0	6	0	0	0	0	1	0	1	0.767
High Int. Volume	0	6	1	0	7	0	0	0	0	0	1	0	6	0	0	6	0	0	0	0	2	1	4	0.500
Peak Factor	0	6	1	0	7	0	0	0	0	0	0.750	0	6	0	0	6	0	0	0	0	1	0	4	0.500

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : us19&cr40  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 2

Start Time	US 19 Southbound				CR 40 Westbound				US 19 Northbound				FOLLOW THAT DREAM PARKWAY (CR 40) Eastbound				Int. Total									
	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left		Thru	Right	RTOR	App. Total					
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																										
By Approach 07:45 AM	1	16	1	0	18	07:00 AM	1	4	0	1	6	08:00 AM	0	18	0	0	0	0	0	18	07:45 AM	1	3	2	2	8
Volume	5.6	86.9	5.6	0.0		16.7	66.7	0.0	16.7		0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		12.5	37.5	25.0	25.0		
High Int. 08:30 AM	0	6	1	0	7	07:30 AM	1	2	0	0	3	08:30 AM	0	6	0	0	0	0	0	6	07:45 AM	1	2	1	0	4
Volume	0	6	1	0	0.643						0.500									0.750					0.500	
Peak Factor																										
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																										
Intersection 04:00 PM	1	18	2	0	21	04:00 PM	1	0	1	0	2	04:00 PM	0	4	0	0	0	0	0	4	04:15 PM	1	4	0	0	5
Volume	4.8	85.7	9.5	0.0		50.0	0.0	50.0	0.0		18.2	72.7	0.0	9.1	0.0	0.0	0.0	0.0	0.0		20.0	80.0	0.0	0.0		
Percent	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	1	0	2	
Volume	0	5	1	0	0.875						0.250									0.688					0.813	
High Int. 04:15 PM	0	5	1	0	6	04:00 PM	1	0	1	0	2	04:00 PM	0	4	0	0	0	0	0	4	04:15 PM	1	1	0	0	2
Volume	0	5	1	0	0.875						0.250									0.688					0.625	
Peak Factor																										
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																										
By Approach 04:00 PM	1	18	2	0	21	04:00 PM	1	0	1	0	2	04:00 PM	0	8	0	0	1	1	1	11	04:15 PM	1	5	0	0	6
Volume	4.8	85.7	9.5	0.0		50.0	0.0	50.0	0.0		18.2	72.7	0.0	9.1	0.0	0.0	0.0	0.0	0.0		16.7	83.3	0.0	0.0		
Percent	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	1	0	2	
Volume	0	5	1	0	0.875						0.250									0.688					0.750	
High Int. 04:15 PM	0	5	1	0	6	04:00 PM	1	0	1	0	2	04:00 PM	0	4	0	0	0	0	0	4	04:15 PM	1	1	0	0	2
Volume	0	5	1	0	0.875						0.250									0.688					0.750	
Peak Factor																										

Turning Movement Count  
 Adams Traffic, Inc.  
 (813) 763-7763

City/County: Inglis/Levy  
 Weather: Clear  
 Comments:

File Name : us198sr121  
 Site Code : 0009091  
 Start Date : 12/15/2009  
 Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles - U-Turns

Start Time	US 19 Southbound						SR 121 Westbound						US 19 Northbound					
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total	
	07:00 AM	0	9	0	9	15	0	0	15	0	17	13	30	0	30	54	54	
07:15 AM	0	14	0	14	16	0	0	16	0	20	6	26	0	26	56	56		
07:30 AM	0	14	0	14	10	0	0	10	0	27	15	42	0	42	66	66		
07:45 AM	0	9	0	9	13	0	0	13	0	17	7	24	0	24	46	46		
Total	0	46	0	46	54	0	0	54	0	81	41	122	0	122	222	222		
08:00 AM	0	12	0	12	6	0	0	6	0	17	14	31	0	31	49	49		
08:15 AM	0	19	0	19	9	0	0	9	0	22	18	40	0	40	68	68		
08:30 AM	0	13	0	13	13	0	0	13	0	28	7	35	0	35	61	61		
08:45 AM	0	10	0	10	22	0	0	22	0	36	14	50	0	50	82	82		
Total	0	54	0	54	50	0	0	50	0	103	53	156	0	156	260	260		

\*\*\* BREAK \*\*\*

04:00 PM	0	33	0	33	15	0	0	15	0	18	14	32	0	32	80	80
04:15 PM	0	24	0	24	19	0	0	19	0	16	15	31	0	31	74	74
04:30 PM	0	26	0	26	18	0	0	18	0	30	14	44	0	44	88	88
04:45 PM	0	32	0	32	22	0	0	22	0	40	8	48	0	48	102	102
Total	0	115	0	115	74	0	0	74	0	104	51	155	0	155	344	344
05:00 PM	0	31	0	31	20	0	0	20	0	29	14	43	0	43	94	94
05:15 PM	0	36	0	36	12	0	0	12	0	49	19	68	0	68	116	116
05:30 PM	0	15	0	15	16	0	0	16	0	36	16	52	0	52	83	83
05:45 PM	0	33	0	33	18	0	0	18	0	28	21	49	0	49	100	100
Total	0	115	0	115	66	0	0	66	0	142	70	212	0	212	393	393
Grand Total	0	330	0	330	244	0	0	244	0	430	215	645	0	645	1219	1219
Approach %	0.0	100.0	0.0	27.1	100.0	0.0	0.0	20.0	0.0	66.7	33.3	52.9	0.0	52.9		
Total %	0.0	27.1	0.0	27.1	20.0	0.0	0.0	20.0	0.0	35.3	17.6		0.0			

Start Time	US 19 Southbound						SR 121 Westbound						US 19 Northbound					
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total	
	08:45 AM - Peak 1 of 1	0	54	0	54	50	0	0	50	0	103	53	156	0	156	260	260	
Intersection Volume	0	100.0	0.0	100.0	100.0	0.0	0.0	22	0	66.0	34.0	50	0	50	82	82		
08:45 Volume	0	10	0	10	22	0	0	22	0	36	14	50	0	50	0.793	0.793		
Peak Factor	0	0.19	0	0.19	0.22	0	0	0.22	0	0.36	0.14	0.50	0	0.50				
High Int. Volume	0	19	0	19	22	0	0	22	0	36	14	50	0	50				
Peak Factor	0	0.19	0	0.19	0.22	0	0	0.22	0	0.36	0.14	0.50	0	0.50				

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : us19&sr121  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 2

Start Time	US 19 Southbound			SR 121 Westbound			US 19 Northbound			App. Total	Right	Left	Thru	Right	Left	Thru	Right	App. Total	Int. Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right											Left
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																				
By Approach	0	54	0	0	0	0	0	0	0	0	0	0	0	0	0	103	53	156		
Volume	0	54	0	0	0	0	0	0	0	0	0	0	0	0	0	66.0	34.0	156		
Percent	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.0	34.0	156		
High Int.	08:15 AM			07:15 AM			07:00 AM			08:00 AM			08:45 AM			08:00 AM				
Volume	0	19	0	16	0	0	16	0	0	16	0	0	0	0	0	36	14	50		
Peak Factor		0.711		0.844			0.844			0.844			0	0	0	0.844		0.780		
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																				
Intersection	04:30 PM			04:45 PM			04:45 PM			05:15 PM			05:15 PM			05:15 PM				
Volume	0	125	0	72	0	0	72	0	0	22	0	0	22	0	0	148	55	203		400
Percent	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	72.9	27.1	203		400
High Int.	05:15 PM			04:45 PM			04:45 PM			04:45 PM			05:15 PM			05:15 PM				
Volume	0	36	0	36	0	0	36	0	0	36	0	0	22	0	0	49	19	68		116
Peak Factor		0.862		0.868			0.868			0.868			0.818			0.862		0.862		
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																				
Intersection	04:30 PM			04:45 PM			04:45 PM			05:15 PM			05:15 PM			05:15 PM				
Volume	0	125	0	79	0	0	79	0	0	22	0	0	22	0	0	142	70	212		400
Percent	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	67.0	33.0	212		400
High Int.	05:15 PM			04:45 PM			04:45 PM			04:45 PM			05:15 PM			05:15 PM				
Volume	0	36	0	36	0	0	36	0	0	22	0	0	22	0	0	49	19	68		116
Peak Factor		0.868		0.868			0.868			0.868			0.868			0.868		0.779		

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : us19&sr121  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 1

Start Time	US 19 Southbound						US 19 Westbound						US 19 Northbound								
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	6	0	6	14	0	0	14	0	0	0	0	0	16	9	25	0	0	0	25	45
07:15 AM	0	13	0	13	14	0	0	14	0	0	0	0	0	18	6	24	0	0	0	24	51
07:30 AM	0	13	0	13	8	0	0	8	0	0	0	0	0	22	15	37	0	0	0	37	58
07:45 AM	0	7	0	7	10	0	0	10	0	0	0	0	0	14	5	19	0	0	0	19	36
Total	0	39	0	39	46	0	0	46	0	0	0	0	0	70	35	105	0	0	0	105	190
08:00 AM	0	12	0	12	6	0	0	6	0	0	0	0	0	16	12	28	0	0	0	28	46
08:15 AM	0	11	0	11	8	0	0	8	0	0	0	0	0	21	17	38	0	0	0	38	57
08:30 AM	0	9	0	9	9	0	0	9	0	0	0	0	0	24	5	29	0	0	0	29	47
08:45 AM	0	10	0	10	18	0	0	18	0	0	0	0	0	30	14	44	0	0	0	44	72
Total	0	42	0	42	41	0	0	41	0	0	0	0	0	91	48	139	0	0	0	139	222

\*\*\* BREAK \*\*\*

04:00 PM	0	31	0	31	12	0	0	12	0	0	0	0	0	16	14	30	0	0	0	30	73
04:15 PM	0	21	0	21	17	0	0	17	0	0	0	0	0	15	13	28	0	0	0	28	66
04:30 PM	0	21	0	21	18	0	0	18	0	0	0	0	0	28	11	39	0	0	0	39	78
04:45 PM	0	32	0	32	21	0	0	21	0	0	0	0	0	38	8	46	0	0	0	46	99
Total	0	105	0	105	68	0	0	68	0	0	0	0	0	97	46	143	0	0	0	143	316
05:00 PM	0	28	0	28	20	0	0	20	0	0	0	0	0	28	10	38	0	0	0	38	86
05:15 PM	0	34	0	34	11	0	0	11	0	0	0	0	0	47	19	66	0	0	0	66	111
05:30 PM	0	15	0	15	15	0	0	15	0	0	0	0	0	35	14	49	0	0	0	49	79
05:45 PM	0	32	0	32	18	0	0	18	0	0	0	0	0	28	21	49	0	0	0	49	99
Total	0	109	0	109	64	0	0	64	0	0	0	0	0	138	64	202	0	0	0	202	375
Grand Total	0	295	0	295	219	0	0	219	0	0	0	0	0	396	193	589	0	0	0	589	1103
Approach %	0.0	100.0	0.0	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	67.2	32.8	53.4	0.0	0.0	0.0	53.4	
Total %	0.0	26.7	0.0	26.7	19.9	0.0	0.0	19.9	0.0	0.0	0.0	0.0	0.0	35.9	17.5		0.0	0.0	0.0		

Start Time	US 19 Southbound						US 19 Westbound						US 19 Northbound									
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right					
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1	0	42	0	42	41	0	0	41	0	0	0	0	0	91	48	139	0	0	0	139	222	
Intersection 08:00 AM	0	100.0	0.0	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	65.5	34.5	44	0.0	0.0	0.0	44	0.771	
08:45 Volume	0	10	0	10	18	0	0	18	0	0	0	0	0	30	14		0	0	0			
Peak Factor	0				08:45 AM				08:45 AM				08:45 AM									
High Int. Volume	0	12	0	12	18	0	0	18	0	0	0	0	0	30	14	44	0	0	0	44	0.771	
Peak Factor	0	0.875	0	0.875	0.569	0	0	0.569	0	0	0	0	0	0.790			0	0	0	0.790		

Turning Movement Count  
 Adams Traffic, Inc.  
 (813) 763-7763

City/County: Ingalls/Levy  
 Weather: Clear  
 Comments:

File Name : us19&sr121  
 Site Code : 00009091  
 Start Date : 12/15/2009  
 Page No : 2

Start Time	US 19 Southbound				SR 121 Westbound				US 19 Northbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1													
By Approach 07:15 AM													
Volume	0	45	0	45	07:00 AM	46	0	0	46	08:00 AM	0	48	139
Percent	0.0	100.0	0.0		100.0	0.0	0.0		0.0	0.0	34.5		
High Int. Volume	0	13	0	13	07:00 AM	14	0	0	14	08:45 AM	0	14	44
Peak Factor				0.865				0.821					0.790
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection 04:45 PM													
Volume	0	109	0	109	04:45 PM	67	0	0	67	05:15 PM	0	51	199
Percent	0.0	100.0	0.0		100.0	0.0	0.0		0.0	0.0	25.6		
High Int. Volume	0	34	0	34	04:45 PM	11	0	0	11	05:15 PM	0	19	66
Peak Factor				0.801				0.798					0.845
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection 04:30 PM													
Volume	0	115	0	115	04:15 PM	76	0	0	76	05:00 PM	0	64	202
Percent	0.0	100.0	0.0		100.0	0.0	0.0		0.0	0.0	31.7		
High Int. Volume	0	34	0	34	04:45 PM	21	0	0	21	05:15 PM	0	19	66
Peak Factor				0.846				0.905					0.765

Turning Movement Count  
 Adams Traffic, Inc.  
 (813) 763-7763

City/County: Ingalls/Levy  
 Weather: Clear  
 Comments:

File Name : us19&sr121  
 Site Code : 00009091  
 Start Date : 12/15/2009  
 Page No : 1

Groups Printed- Heavy Vehicles

Start Time	US 19 Southbound			SR 121 Westbound			US 19 Northbound			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	3	0	1	0	0	1	0	4	5
07:15 AM	0	1	0	2	0	0	2	0	0	2
07:30 AM	0	1	0	2	0	0	2	0	0	5
07:45 AM	0	2	0	3	0	0	3	0	2	5
Total	0	7	0	8	0	0	8	0	11	17
08:00 AM	0	0	0	0	0	0	0	0	1	2
08:15 AM	0	8	0	1	0	0	1	0	1	2
08:30 AM	0	4	0	4	0	0	4	0	2	6
08:45 AM	0	0	0	4	0	0	4	0	0	6
Total	0	12	0	9	0	0	9	0	12	17

\*\*\* BREAK \*\*\*

04:00 PM	0	2	0	3	0	0	3	0	0	2
04:15 PM	0	3	0	2	0	0	2	0	2	3
04:30 PM	0	5	0	0	0	0	0	0	3	5
04:45 PM	0	0	0	1	0	0	1	0	0	2
Total	0	10	0	6	0	0	6	0	7	12
05:00 PM	0	3	0	0	0	0	0	0	1	4
05:15 PM	0	2	0	1	0	0	1	0	2	5
05:30 PM	0	0	0	1	0	0	1	0	1	2
05:45 PM	0	1	0	0	0	0	0	0	0	1
Total	0	6	0	2	0	0	2	0	4	10
Grand Total	0	35	0	25	0	0	25	0	34	56
Approach %	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0	60.7	39.3
Total %	0.0	30.2	0.0	21.6	0.0	0.0	21.6	0.0	29.3	19.0

Start Time	US 19 Southbound			SR 121 Westbound			US 19 Northbound			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
08:00 AM to 08:45 AM - Peak 1 of 1	0	14	0	8	0	0	8	0	9	16
Intersection 07:45 AM	0	0	0	100.0	0.0	0.0	0	0	56.3	43.8
Volume	0	0	0	4	0	0	4	0	4	2
Percent	0.0	100.0	0.0	4	0	0	4	0	4	6
08:30 Volume	0	0	0	08:30 AM	0	0	08:30 AM	0	0	0.679
Peak Factor	0	0	0	0	0	0	0	0	0	0
High Int. 08:15 AM	0	0	0	4	0	0	4	0	4	2
Volume	0	8	0	4	0	0	4	0	2	6
Peak Factor	0	0.438	0	0.500	0	0	0.500	0	0.667	0.667

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : us19&sr121  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 2

Start Time	US 19 Southbound				SR 121 Westbound				US 19 Northbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1													
By Approach 07:45 AM	0	14	0	14	9	0	0	9	0	11	6	17	
Volume	0	14	0	14	9	0	0	9	0	11	6	17	
Percent	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	64.7	35.3	0.0	
High Int. 08:15 AM	0	8	0	8	4	0	0	4	0	1	4	5	
Volume	0	8	0	8	4	0	0	4	0	1	4	5	
Peak Factor		0.438		0.438				0.563				0.850	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection 04:15 PM													
Volume	0	11	0	11	3	0	0	3	0	6	9	15	29
Percent	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	40.0	60.0	0.0	
04:30 Volume	0	5	0	5	0	0	0	0	0	2	3	5	10
Peak Factor												0.725	
High Int. 04:30 PM	0	5	0	5	2	0	0	2	0	2	3	5	
Volume	0	5	0	5	2	0	0	2	0	2	3	5	
Peak Factor		0.550		0.550				0.375				0.750	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1													
Intersection 04:15 PM													
Volume	0	11	0	11	6	0	0	6	0	6	9	15	
Percent	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	40.0	60.0	0.0	
04:30 Volume	0	5	0	5	3	0	0	3	0	2	3	5	
Peak Factor		0.550		0.550				0.500				0.750	



Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

File Name : sr121&cr336  
Site Code : 00090991  
Start Date : 12/15/2009  
Page No : 1

City/County: Inglis/Levy  
Weather: Clear  
Comments:

Groups Printed- Passenger Vehicles - Heavy Vehicles - U-Turns

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
07:00 AM	2	13	1	16	2	5	0	7	0	12	1	13	1	1	0	2
07:15 AM	0	13	1	14	3	4	1	8	0	5	1	6	0	4	0	4
07:30 AM	0	12	4	16	0	5	0	5	0	14	1	15	0	1	0	1
07:45 AM	0	9	1	10	2	1	0	3	0	6	1	7	0	5	0	5
Total	2	47	7	56	7	15	1	23	0	37	4	41	1	11	0	12
08:00 AM	0	6	1	7	1	0	1	2	0	12	2	14	0	1	0	1
08:15 AM	0	8	2	10	0	2	0	2	0	13	4	17	0	6	0	6
08:30 AM	0	12	0	12	1	4	0	5	0	8	0	8	1	1	0	2
08:45 AM	0	21	0	21	1	2	0	3	0	12	0	12	0	0	0	0
Total	0	47	3	50	3	8	1	12	0	45	6	51	1	8	0	9

\*\*\* BREAK \*\*\*

04:00 PM	1	13	2	16	1	2	0	3	0	14	0	14	0	1	0	1
04:15 PM	0	18	0	18	1	5	0	6	0	13	2	15	1	2	0	3
04:30 PM	1	13	0	14	5	2	1	8	0	12	2	14	1	2	0	3
04:45 PM	0	21	0	21	1	2	0	3	0	7	1	8	2	2	0	4
Total	2	65	2	69	8	11	1	20	0	46	5	51	4	7	0	11
05:00 PM	0	18	0	18	2	3	1	6	0	13	1	14	1	2	0	3
05:15 PM	2	11	1	14	1	2	0	3	0	16	2	18	1	4	0	5
05:30 PM	1	16	0	17	2	3	0	5	0	16	1	17	0	5	0	5
05:45 PM	0	13	0	13	3	1	1	5	0	17	2	19	2	1	0	3
Total	3	58	1	62	8	9	2	19	0	62	6	68	4	12	0	16
Grand Total	7	217	13	237	26	43	5	74	0	190	21	211	10	38	0	48
Approach %	3.0	91.6	5.5	35.1	58.1	6.8	0.9	13.0	0.0	90.0	10.0	20.8	1.8	6.7	0.0	8.4
Total %	1.2	36.1	2.3	41.6	4.6	7.5	0.9	13.0	0.0	33.3	3.7	37.0	1.8	6.7	0.0	8.4

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
07:00 AM	2	47	7	56	7	15	1	23	0	37	4	41	1	11	0	12
Intersection Volume	3.6	83.9	12.5	30.4	65.2	4.3	0.0	90.2	9.8	8.3	91.7	0.0	0	0	0	0
07:00 Volume	2	13	1	16	2	5	0	7	1	12	1	13	1	1	0	2
Peak Factor	0.700 AM			0.715 AM				0.730 AM					0.745 AM			0.868
High Int. Volume	2	13	1	16	3	4	1	8	1	14	1	15	0	5	0	5
Peak Factor				0.875				0.719				0.683				0.600

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : sr121&cr336  
Site Code : 0009091  
Start Date : 12/15/2009  
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	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																
By Approach 07:00 AM	2	47	7	56	7	15	1	23	0	0	0	0	1	13	0	14
Volume	3.6	83.9	12.5		30.4	65.2	4.3		0.0	0.0	0.0		7.1	92.9	0.0	
High Int. 07:00 AM	2	13	1	16	3	4	1	8	0	0	0	0	0	6	0	6
Volume				0.875				0.719				0.779				0.583
Peak Factor																
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																
Intersection 05:00 PM																
By Approach 05:00 PM	3	58	1	62	8	9	2	19	0	0	0	0	4	12	0	16
Volume	4.8	93.5	1.6		42.1	47.4	10.5		0.0	0.0	0.0		25.0	75.0	0.0	
High Int. 05:30 PM	1	16	0	17	2	3	0	5	0	0	0	0	0	5	0	5
Volume				0.938												0.938
Peak Factor																
High Int. 05:00 PM	0	18	0	18	2	3	1	6	0	0	0	0	1	4	0	5
Volume				0.861				0.792				0.895				0.800
Peak Factor																
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																
By Approach 04:15 PM	1	70	0	71	9	12	2	23	0	0	0	0	4	13	0	17
Volume	1.4	98.6	0.0		39.1	52.2	8.7		0.0	0.0	0.0		23.5	76.5	0.0	
High Int. 04:45 PM	0	21	0	21	5	2	1	8	0	0	0	0	1	4	0	5
Volume				0.845				0.719				0.895				0.850
Peak Factor																

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : sr121&cr336  
Site Code : 00009091  
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Groups Printed- Passenger Vehicles

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	1	12	1	14	2	5	0	7	0	9	0	9	0	1	0	1	31
07:15 AM	0	11	1	12	3	3	1	7	0	5	1	6	0	3	0	3	28
07:30 AM	0	10	3	13	0	4	0	4	0	14	1	15	0	1	0	1	33
07:45 AM	0	6	0	6	2	1	0	3	0	4	1	5	0	4	0	4	18
Total	1	39	5	45	7	13	1	21	0	32	3	35	0	9	0	9	110
08:00 AM	0	6	1	7	1	0	1	2	0	10	2	12	0	1	0	1	22
08:15 AM	0	7	2	9	0	2	0	2	0	12	4	16	0	4	0	4	31
08:30 AM	0	8	0	8	1	4	0	5	0	6	1	7	0	1	0	2	21
08:45 AM	0	17	0	17	1	2	0	3	0	12	0	12	0	0	0	0	32
Total	0	38	3	41	3	8	1	12	0	40	6	46	1	6	0	7	106

\*\*\* BREAK \*\*\*

04:00 PM	1	11	2	14	1	2	0	3	0	14	0	14	0	1	0	1	32
04:15 PM	0	16	0	16	1	4	0	5	0	11	2	13	1	2	0	3	37
04:30 PM	1	13	0	14	5	2	1	8	0	9	2	11	1	2	0	3	36
04:45 PM	0	20	0	20	1	2	0	3	0	7	1	8	1	2	0	3	34
Total	2	60	2	64	8	10	1	19	0	41	5	46	3	7	0	10	139
05:00 PM	0	18	0	18	2	3	1	6	0	9	1	10	1	2	0	3	37
05:15 PM	2	10	1	13	1	2	0	3	0	16	2	18	1	4	0	5	39
05:30 PM	1	15	0	16	2	2	0	4	0	14	1	15	0	5	0	5	40
05:45 PM	0	13	0	13	3	1	1	5	0	17	2	19	2	1	0	3	40
Total	3	56	1	60	8	8	2	18	0	56	6	62	4	12	0	16	156
Grand Total	6	193	11	210	26	39	5	70	0	169	20	189	8	34	0	42	511
Approach %	2.9	91.9	5.2	99.1	37.1	55.7	7.1	13.7	0.0	89.4	10.6	37.0	19.0	81.0	0.0	0.0	8.2
Total %	1.2	37.8	2.2	41.1	5.1	7.6	1.0	13.7	0.0	33.1	3.9	37.0	1.5	6.7	0.0	8.2	

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	1	39	5	45	7	13	1	21	0	32	3	35	0	9	0	9	110
Volume	2.2	86.7	11.1	100.0	33.3	61.9	4.8	100.0	0.0	91.4	8.6	100.0	0.0	100.0	0.0	100.0	110
Percent	0	10	3	13	0	4	0	4	0	14	1	15	0	1	0	1	33
Peak Factor																	0.833
High Int. Volume	1	12	1	14	2	5	0	7	0	14	1	15	0	4	0	4	4
Peak Factor				0.804				0.750				0.563					0.563

Turning Movement Count  
 Adams Traffic, Inc.  
 (813) 763-7763

City/County: Inglis/Levy  
 Weather: Clear  
 Comments:

File Name : sr121&cr336  
 Site Code : 0009091  
 Start Date : 12/15/2009  
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Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																
By Approach	07:00 AM				07:00 AM				07:30 AM				07:45 AM			
Volume	1	39	5	45	7	13	1	21	0	40	8	48	1	10	0	11
Percent	2.2	86.7	11.1		33.3	61.9	4.8		0.0	83.3	16.7		9.1	90.9	0.0	
High Int.	07:00 AM															
Volume	1	12	1	14	2	5	0	7	0	12	4	16	0	4	0	4
Peak Factor				0.804				0.750				0.750				0.688
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																
Intersection	05:00 PM															
Volume	3	56	1	60	8	8	2	18	0	56	6	62	4	12	0	16
Percent	5.0	93.3	1.7		44.4	44.4	11.1		0.0	90.3	9.7		25.0	75.0	0.0	
05:45 Volume	0	13	0	13	3	1	1	5	0	17	2	19	2	1	0	3
Peak Factor																0.975
High Int.	05:00 PM															
Volume	0	18	0	18	2	3	1	6	0	17	2	19	1	4	0	5
Peak Factor				0.833				0.750				0.816				0.800
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																
By Approach	04:15 PM				04:15 PM				05:00 PM				04:45 PM			
Volume	1	67	0	68	9	11	2	22	0	56	6	62	3	13	0	16
Percent	1.5	98.5	0.0		40.9	50.0	9.1		0.0	90.3	9.7		18.8	81.3	0.0	
High Int.	04:45 PM															
Volume	0	20	0	20	5	2	1	8	0	17	2	19	1	4	0	5
Peak Factor				0.850				0.688				0.816				0.800

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : sr121&cr336  
Site Code : 00009091  
Start Date : 12/15/2009  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
07:00 AM	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	2	0	2	0	1	0	1	0	0	0	0	0	1	0	0
07:30 AM	0	2	1	3	0	1	0	1	0	0	0	0	0	0	0	0
07:45 AM	0	3	1	4	0	0	0	0	2	0	0	2	0	1	0	1
Total	1	8	2	11	0	2	0	2	0	5	1	6	0	2	0	2
08:00 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0
08:15 AM	0	1	0	1	0	0	0	0	1	0	0	1	0	2	0	2
08:30 AM	0	4	0	4	0	0	0	0	2	0	0	2	0	0	0	0
08:45 AM	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	9	0	9	0	0	0	0	5	0	0	5	0	2	0	2
*** BREAK ***																
04:00 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	2	0	2	0	1	0	1	0	2	0	2	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0
04:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1
Total	0	5	0	5	0	1	0	1	0	5	0	5	1	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0
05:15 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	1	0	1	0	1	0	1	0	2	0	2	0	0	0	0
Total	0	2	0	2	0	1	0	1	0	6	0	6	0	0	0	0
Grand Total	1	24	2	27	0	4	0	4	0	21	1	22	1	4	0	5
Approach %	3.7	88.9	7.4	99.0	0.0	100.0	0.0	100.0	0.0	95.5	4.5	99.0	20.0	80.0	0.0	80.0
Total %	1.7	41.4	3.4	46.6	0.0	6.9	0.0	6.9	0.0	36.2	1.7	37.9	1.7	6.9	0.0	8.6

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
07:00 AM	1	8	2	11	0	2	0	2	0	5	1	6	0	2	0	2
07:15 AM	0	2	0	2	0	1	0	1	0	0	0	0	0	1	0	0
07:30 AM	0	2	1	3	0	1	0	1	0	0	0	0	0	0	0	0
07:45 AM	0	3	1	4	0	0	0	0	2	0	0	2	0	1	0	1
Total	1	15	4	20	0	4	0	4	0	7	1	8	0	4	0	3
07:45 AM	0	3	1	4	0	1	0	1	0	3	1	4	0	1	0	1
High Int. Volume	0	3	1	4	0	1	0	1	0	3	1	4	0	1	0	1
Peak Factor				0.688				0.500				0.375				0.500

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
07:00 AM	1	8	2	11	0	2	0	2	0	5	1	6	0	2	0	2
07:15 AM	0	2	0	2	0	1	0	1	0	0	0	0	0	1	0	0
07:30 AM	0	2	1	3	0	1	0	1	0	0	0	0	0	0	0	0
07:45 AM	0	3	1	4	0	0	0	0	2	0	0	2	0	1	0	1
Total	1	15	4	20	0	4	0	4	0	7	1	8	0	4	0	3
High Int. Volume	0	3	1	4	0	1	0	1	0	3	1	4	0	1	0	1
Peak Factor				0.688				0.500				0.375				0.500

Start Time	SR 121 Southbound				CR 336 Westbound				SR 121 Northbound				CR 336 Eastbound			
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total
07:00 AM	1	8	2	11	0	2	0	2	0	5	1	6	0	2	0	2
07:15 AM	0	2	0	2	0	1	0	1	0	0	0	0	0	1	0	0
07:30 AM	0	2	1	3	0	1	0	1	0	0	0	0	0	0	0	0
07:45 AM	0	3	1	4	0	0	0	0	2	0	0	2	0	1	0	1
Total	1	15	4	20	0	4	0	4	0	7	1	8	0	4	0	3
High Int. Volume	0	3	1	4	0	1	0	1	0	3	1	4	0	1	0	1
Peak Factor				0.688				0.500				0.375				0.500

Turning Movement Count  
Adams Traffic, Inc.  
(813) 763-7763

City/County: Inglis/Levy  
Weather: Clear  
Comments:

File Name : sr121&cc336  
Site Code : 0009091  
Start Date : 12/15/2009  
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Start Time	SR 121 Southbound			CR 336 Westbound			SR 121 Northbound			CR 336 Eastbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1												
By Approach 07:00 AM	1	8	2	0	2	0	0	7	0	0	3	0
Volume	9.1	72.7	18.2	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0
High Int. 07:45 AM	0	3	1	0	1	0	0	2	0	0	2	0
Volume												
Peak Factor		0.688		0.500			0.875			0.375		
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1												
Intersection 04:15 PM												
Volume	0	3	0	0	1	0	0	9	0	1	0	0
Percent	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0
04:15 Volume	0	2	0	0	1	0	0	2	0	0	0	0
Peak Factor												
High Int. 04:15 PM												
Volume	0	2	0	0	1	0	0	4	0	1	0	0
Peak Factor		0.375		0.250			0.563			0.250		
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1												
By Approach 04:00 PM												
Volume	0	5	0	0	1	0	0	9	0	0	0	0
Percent	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0
High Int. 04:00 PM												
Volume	0	2	0	0	1	0	0	4	0	1	0	0
Peak Factor		0.625		0.250			0.563			0.250		





FDOT SEASONAL ADJUSTMENT FACTOR

2008 Peak Season Factor Category Report - Report Type: ALL  
 Category: 3400 LEVY COUNTYWIDE

Week	Dates	SF	MOCF: 0.92 PSCF
1	01/01/2008 - 01/05/2008	1.00	1.08
2	01/06/2008 - 01/12/2008	1.01	1.10
3	01/13/2008 - 01/19/2008	1.02	1.11
4	01/20/2008 - 01/26/2008	1.00	1.08
5	01/27/2008 - 02/02/2008	0.98	1.06
* 6	02/03/2008 - 02/09/2008	0.95	1.03
* 7	02/10/2008 - 02/16/2008	0.93	1.01
* 8	02/17/2008 - 02/23/2008	0.92	1.00
* 9	02/24/2008 - 03/01/2008	0.92	1.00
*10	03/02/2008 - 03/08/2008	0.91	0.99
*11	03/09/2008 - 03/15/2008	0.91	0.99
*12	03/16/2008 - 03/22/2008	0.91	0.99
*13	03/23/2008 - 03/29/2008	0.91	0.99
*14	03/30/2008 - 04/05/2008	0.91	0.99
*15	04/06/2008 - 04/12/2008	0.92	1.00
*16	04/13/2008 - 04/19/2008	0.92	1.00
*17	04/20/2008 - 04/26/2008	0.93	1.01
*18	04/27/2008 - 05/03/2008	0.95	1.03
19	05/04/2008 - 05/10/2008	0.97	1.05
20	05/11/2008 - 05/17/2008	0.98	1.06
21	05/18/2008 - 05/24/2008	0.99	1.07
22	05/25/2008 - 05/31/2008	1.01	1.10
23	06/01/2008 - 06/07/2008	1.02	1.11
24	06/08/2008 - 06/14/2008	1.03	1.12
25	06/15/2008 - 06/21/2008	1.04	1.13
26	06/22/2008 - 06/28/2008	1.04	1.13
27	06/29/2008 - 07/05/2008	1.04	1.13
28	07/06/2008 - 07/12/2008	1.04	1.13
29	07/13/2008 - 07/19/2008	1.05	1.14
30	07/20/2008 - 07/26/2008	1.07	1.16
31	07/27/2008 - 08/02/2008	1.09	1.18
32	08/03/2008 - 08/09/2008	1.11	1.20
33	08/10/2008 - 08/16/2008	1.13	1.23
34	08/17/2008 - 08/23/2008	1.12	1.21
35	08/24/2008 - 08/30/2008	1.11	1.20
36	08/31/2008 - 09/06/2008	1.10	1.19
37	09/07/2008 - 09/13/2008	1.09	1.18
38	09/14/2008 - 09/20/2008	1.09	1.18
39	09/21/2008 - 09/27/2008	1.06	1.15
40	09/28/2008 - 10/04/2008	1.04	1.13
41	10/05/2008 - 10/11/2008	1.02	1.11
42	10/12/2008 - 10/18/2008	1.00	1.08
43	10/19/2008 - 10/25/2008	1.00	1.08
44	10/26/2008 - 11/01/2008	1.00	1.08
45	11/02/2008 - 11/08/2008	1.01	1.10
46	11/09/2008 - 11/15/2008	1.01	1.10
47	11/16/2008 - 11/22/2008	1.01	1.10
48	11/23/2008 - 11/29/2008	1.00	1.08
49	11/30/2008 - 12/06/2008	1.00	1.08
50	12/07/2008 - 12/13/2008	1.00	1.08
51	12/14/2008 - 12/20/2008	1.00	1.08
52	12/21/2008 - 12/27/2008	1.01	1.10
53	12/28/2008 - 12/31/2008	1.02	1.11

\* Peak Season

## GROWTH RATE CALCULATION

Florida Department of Transportation  
 Transportation Statistics Office  
 2008 Historical AADT Report

County: 34 - LEVY

Site: 0030 - SR 55 AT N CITY LIMITS OF INGLIS

Year	AADT	Direction 1	Direction 2	K Factor	D Factor	T Factor
2008	5800 C	N 2900	S 2900	12.80	59.04	12.60
2007	4900 C	N 2400	S 2500	12.52	59.16	12.30
2006	5200 C	N 2500	S 2700	12.14	58.73	13.30
2005	5300 C	N 2600	S 2700	13.70	59.10	19.60
2004	5300 C	N 2700	S 2600	10.70	57.50	17.20
2003	4000 C	N 1900	S 2100	11.50	54.60	15.50
2002	4200 C	N 2400	S 1800	12.20	58.10	21.20
2001	5000 C	N 2500	S 2500	14.70	67.50	17.50
2000	4300 C	N 2200	S 2100	12.80	60.00	21.90
1999	4800 C	N 2500	S 2300	13.90	53.00	19.40
1998	3700 C	N 1900	S 1800	14.40	61.60	19.70
1997	4100 C	N 2000	S 2100	13.20	57.10	16.70
1996	4800 C	N 2300	S 2500	15.00	60.20	16.70
1995	4500 C	N 2300	S 2200	14.30	61.60	18.70
1994	5300 C	N 2800	S 2500	12.80	55.60	17.20
1993	4200 C	N 2200	S 2000	0.00	0.00	0.00

$$GR = \frac{\frac{5800 - 4200}{4200}}{2008 - 1993} = 2.5\%$$

AADT Flags: C = Computed; E = Manual Estimate; F = First Year Estimate  
 S = Second Year Estimate; T = Third Year Estimate; X = Unknown

Printed on: 02/09/2010

FLORIDA DEPARTMENT OF TRANSPORTATION  
TRANSPORTATION STATISTICS OFFICE  
2008 AADT FORECAST

COUNTY: 34 LEVY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SITE DESCRIPTION	5,900	6,000	6,100	6,200	6,400	6,500	6,600	6,700	6,800	6,900
0030 SR 65 AT N CITY LIMITS OF INGLIS										

$$GR = \frac{\left[ \frac{6,900 - 5,900}{5,900} \right]}{2018 - 2009} = 1.88\%$$

Future year AADT estimates are projections using from 4 to 13 years of data. A straight line is fitted between the average of the earliest and latest 3 years of data--for example the 1991-1993 average and the 2001-2003 average. If 13 years of history are available, the AADT is projected for a maximum of 10 years; if only 4 years of data are available, the AADT is only projected for 1 year. If there are less than 3 years of history at a station, future year AADTs are not calculated.

Florida Department of Transportation  
 Transportation Statistics Office  
 2008 Historical AADT Report

County: 34 - LEVY

Site: 0086 - SR 121 0.2 MI NE OF SR 55

Year	AADT	Direction 1		Direction 2		K Factor	D Factor	T Factor
2008	1500 C	E	0	W	0	12.80	59.04	5.50
2007	1600 C	E	0	W	0	12.52	59.16	5.40
2006	1700 C	E	0	W	0	12.14	58.73	7.40
2005	1600 C	E		W		13.70	59.10	13.00
2004	1700 C	E		W		10.70	57.50	12.70
2003	1500 C	E		W		11.50	54.60	10.00
2002	1500 C	E		W		12.20	58.10	12.20
2001	1400 C	E		W		14.70	67.50	9.60
2000	1000 C	E		W		12.80	60.00	10.80
1999	1000 C	E		W		13.90	53.00	7.60
1998	1100 C	E		W		14.40	61.60	8.10
1997	1500 C	E		W		13.20	57.10	10.40
1996	1100 C	E		W		15.00	60.20	6.20
1995	1200 C	E		W		14.30	61.60	6.10
1994	1300 C	E		W		12.80	55.60	4.70
1993	1100 C	E		W		0.00	0.00	0.00

$$GR = \frac{1,500 - 1,100}{1,100} = 2.42\%$$

2008-1993

AADT Flags: C = Computed; E = Manual Estimate; F = First Year Estimate  
 S = Second Year Estimate; T = Third Year Estimate; X = Unknown

Printed on: 02/09/2010

FLORIDA DEPARTMENT OF TRANSPORTATION  
TRANSFORMATION STATISTICS OFFICE  
2008 ADT FORECAST

COUNTY: 34 LEVY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SITE DESCRIPTION	1,500	1,600	1,600	1,600	1,700	1,700	1,800	1,800	1,800	1,900
0086 SR 121 0.2 MI NE OF SR 55	1,500	1,600	1,600	1,600	1,700	1,700	1,800	1,800	1,800	1,900

$$GR = \frac{\frac{1,900 - 1,500}{1,500}}{2018 - 2009} = 2.967\%$$

Future year ADT estimates are projections using from 4 to 13 years of data. A straight line is fitted between the average of the earliest and latest 3 years of data--for example the 1991-1993 average and the 2001-2003 average. If 13 years of history are available, the ADT is projected for a maximum of 10 years; if only 4 years of data are available, the ADT is only projected for 1 year. If there are less than 3 years of history at a station, future year ADTs are not calculated.

Florida Department of Transportation  
 Transportation Statistics Office  
 2008 Historical AADT Report

County: 34 - LEVY

Site: 0016 - SR-55 0.1MI NW OF SR-336

Year	AADT	Direction 1		Direction 2		K Factor	D Factor	T Factor
2008	3700 C	N	1800	S	1900	12.80	59.04	12.60
2007	3200 C	N	1500	S	1700	12.52	59.16	12.30
2006	3800 C	N	1800	S	2000	12.14	58.73	13.30
2005	3900 C	N	2000	S	1900	13.70	59.10	19.60
2004	2500 C	N		S		10.70	57.50	17.20
2003	3900 C	N	1900	S	2000	11.50	54.60	15.50
2002	3800 C	N	1800	S	2000	12.20	58.10	21.20
2001	3700 C	N	1800	S	1900	14.70	67.50	17.50
2000	3800 C	N	1800	S	2000	12.80	60.00	21.90
1999	3500 C	N	1800	S	1700	13.90	53.00	19.40
1998	2900 C	N	1500	S	1400	14.40	61.60	19.70
1997	3200 C	N	1500	S	1700	13.20	57.10	16.70
1996	4000 C	N	1900	S	2100	15.00	60.20	16.70
1995	3600 C	N	1800	S	1800	14.30	61.60	18.70
1994	4100 C	N	2200	S	1900	12.80	55.60	17.20
1993	3300 C	N	1700	S	1600	0.00	0.00	0.00

$$GR = \frac{\left[ \frac{3700 - 3300}{3300} \right]}{2008 - 1993} = 0.81\%$$

AADT Flags: C = Computed; E = Manual Estimate; F = First Year Estimate  
 S = Second Year Estimate; T = Third Year Estimate; X = Unknown

Printed on: 02/09/2010

FLORIDA DEPARTMENT OF TRANSPORTATION  
TRANSPORTATION STATISTICS OFFICE  
2008 AADT FORECAST

COUNTY: 34 LEVY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SITE DESCRIPTION										
0016 SR-55 0.1MI NW OF SR-336	3,700	3,700	3,800	3,800	3,800	3,800	3,800	3,900	3,900	3,900

$$GR = \frac{3,900 - 3,700}{3,700} = 0.60\%$$

2018 - 2009

Future year AADT estimates are projections using from 4 to 13 years of data. A straight line is fitted between the average of the earliest and latest 3 years of data--for example the 1991-1993 average and the 2001-2003 average. If 13 years of history are available, the AADT is projected for a maximum of 10 years; if only 4 years of data are available, the AADT is only projected for 1 year. If there are less than 3 years of history at a station, future year AADTs are not calculated.

PEAK SEASON TRAFFIC

TABLE A-3  
AM PEAK HOUR EXISTING TRAFFIC CALCULATION

Roadway	Location	Count Date	Count Time	AM Peak Hour			FDOT Peak Season Adjustment Factor	Peak Season Peak Hour Volume		
				NB/EB	SB/WB	Total		NB/EB	SB/WB	Total
Kings Rd.	US 19 and Project	3/18/2010	7:45 AM	0	0	0	1.0	0	0	0
US 19	Between CR 326 and SR 121	12/15/2009	8:00 AM	105	88	193	1.08	119	87	206
		12/16/2009	8:00 AM	105	84	189				
		12/17/2009	8:00 AM	121	70	191				
US 19	Between SR 121 and CR 40	12/15/2009	8:00 AM	157	125	282	1.08	174	124	298
		12/16/2009	8:00 AM	159	121	280				
		12/17/2009	7:45 AM	168	100	268				
US 19	Between CR 40 and Citrus County	12/15/2009	8:00 AM	261	260	521	1.08	279	258	537
		12/16/2009	7:30 AM	252	247	499				
		12/17/2009	8:00 AM	262	210	472				
CR 40	Between US 19 to Marion County	12/15/2009	7:45 AM	144	94	238	1.08	140	93	233
		12/16/2009	7:30 AM	120	86	206				
		12/17/2009	7:15 AM	126	79	205				
SR 121	Between US 19 and CR 337	12/15/2009	7:00 AM	40	74	114	1.08	56	66	122
		12/16/2009	8:00 AM	69	48	117				
		12/17/2009	7:00 AM	47	62	109				
CR 336	Between SR 121 and Marion County	12/15/2009	7:30 AM	25	13	38	1.08	19	26	45
		12/16/2009	7:00 AM	14	30	44				
		12/17/2009	7:00 AM	16	30	46				
				18	24	42				

TABLE A-4  
PM PEAK HOUR EXISTING TRAFFIC CALCULATION

Roadway	Location	Count Date	Count Time	PM Peak Hour			FDOT Peak Season Adjustment Factor	Peak Season Peak Hour Volume		
				NB/EB	SB/WB	Total		NB/EB	SB/WB	Total
Kings Rd.	US 19 and Project	3/18/2010	4:30 PM	5	1	6	1.0	5	1	6
US 19	Between CR 326 and SR 121	12/15/2009	4:30 PM	140	142	282	1.08	149	158	307
		12/16/2009	4:00 PM	133	278					
		12/17/2009	4:00 PM	164	294					
US 19	Between SR 121 and CR 40	12/15/2009	4:30 PM	186	210	396	1.08	213	221	434
		12/16/2009	5:00 PM	211	406					
		12/17/2009	4:00 PM	195	210					
US 19	Between CR 40 and Citrus County	12/15/2009	4:45 PM	441	350	791	1.08	451	366	817
		12/16/2009	5:00 PM	447	322					
		12/17/2009	4:00 PM	365	711					
CR 40	Between US 19 to Marion County	12/15/2009	4:00 PM	151	179	330	1.08	139	195	334
		12/16/2009	4:45 PM	110	203					
		12/17/2009	4:00 PM	126	161					
SR 121	Between US 19 and CR 337	12/15/2009	4:00 PM	61	70	131	1.08	75	73	148
		12/16/2009	4:45 PM	68	61					
		12/17/2009	4:00 PM	77	149					
CR 336	Between SR 121 and Marion County	12/15/2009	5:00 PM	22	22	44	1.08	27	22	49
		12/16/2009	4:30 PM	28	25					
		12/17/2009	4:30 PM	24	12					
				25	20	45				

LEVY COUNTY TRANSPORTATION ELEMENT

## CHAPTER 2

## TRANSPORTATION ELEMENT

The purpose of the Traffic Circulation element is to evaluate the present transportation system in terms of current and projected requirements and to identify improvements that will eliminate existing problems and provide for future transportation needs. A properly planned transportation system is necessary to provide convenient and efficient movement of goods, services and people within Levy County.

Existing Transportation System

Transportation in Levy County is essentially highway oriented. However, the county's transportation system also includes other key elements such as airport and railroad facilities and bus and trucking services. This portion of the Traffic Circulation Element provides a description of each of these elements with primary emphasis on the highway network.

Levels of Service

Levels of service [LOS] are a good summary of present and future facility conditions. The LOS of a roadway is often defined as the ability of a maximum number of vehicles to pass over a given section of roadway or through an intersection during a specified period of time, while a given operating condition is maintained. The standardized description of service levels used in transportation planning are as follows.

**LOS A:** Highest LOS which described primarily free-flow traffic operations at average travel speeds. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delays at intersections are minimal.

**LOS B:** Represents reasonably impeded traffic flow operations at average travel speeds. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tensions.

**LOS C:** Represents stable traffic flow operations. However, ability to maneuver and change lanes may be more restricted than LOS B, and longer queues and/or adverse signal coordination may contribute to lower average travel speeds.

**LOS D:** Borders on a range in which small increases in traffic flow may cause substantial increases in approach delay and, hence decreases in speed. This may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combinations of these.

**LOS E:** This represents traffic flow characterized by significant delays and lower operating speeds. Such operations are caused by some combination of adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.

**LOS F:** This represents traffic flow characterized by extremely low speeds. Intersection congestion is likely at critical signalized locations, with long approach delays resulting. Adverse signal

progression is frequently a contributor to this condition.

### **Highways**

The road network in Levy County is made up of federal, state and local highways. This section reviews the existing system in terms of functional classification, condition, average daily traffic volume, design standards/policies and improvement plan.

### **Functional Classification**

In addition to levels of service, it is necessary to include definitions to clarify the terminology used throughout the text and tables. Streets are classified according to the function they will serve. Functional classification is defined as the assignment of roads into systems according to the character of service they provide in relation to the total road network. Basic functional categories include arterial, collector, and local roads which may be subdivided into principal, major, or minor levels. Those levels may be additionally divided into rural and urban categories. The location and function of the major highways in Levy County are shown on Map 2-1.

The criteria used to establish the predominant function of each major highway segment is listed below.

- (1) **Arterial Road** A route providing service which is relatively continuous and of relatively high traffic volume, long average trip length, high operating speed, and high mobility importance. In addition, all United States numbered highways shall be arterial roads.
- (2) **Collector Road** A route providing service which is of relatively moderate average traffic volume, moderately average trip length, and moderately average operating speed. These routes also collect and distribute traffic between local roads or arterial roads and serve as a linkage between land access and mobility needs.
- (3) **Local Road** A route providing service which is of relatively low average traffic volume, short average trip length or minimal through-traffic movements, and high land access for abutting property.

MAP 2-1

EXISTING  
HIGHWAY FUNCTIONAL  
CLASSIFICATION MAP

MAP 2-1a

LEVEL OF SERVICE MAP

MAP 2-4

FUTURE TRAFFIC CIRCULATION

**Condition**

The major road network in Levy County is in good condition and well maintained. Table 2-1 lists major collectors by location, length, pavement width, right-of-way width and general condition. With one exception [a short span of S.R. 320], pavement widths of two lane roads are eighteen [18] feet and right-of-way widths vary from fifty [50] to one hundred [100] feet.

All roads and highways in Levy County are two lane except for a portion of Highway 27 going through Williston, and U.S. Highway 19 through all of Levy County, both of which are four-lane. Map 2-1 illustrates the number of lanes for each roadway within Levy County.

**Average Daily Traffic Volumes [ADT]**

Traffic volumes of arterials and collectors in Levy County are provided by the Florida Department of Transportation. Table 2-2 shows historic traffic volumes and projections for major highways in the County. Map 2-2 shows historic traffic volumes. The greatest increases have occurred in the Williston area, on U.S. 27. According to AADT and actual observation, all roads in Levy County are operating at a level of service of B or higher.

**Design Standards And Policies**

Existing standards and policies for the design and construction of Levy County's roads are specified in state and local directives. The minimum front setbacks for building range from 25 feet [R-3 multi-family residential] to 100 feet [F-1 floodplain]. Minimum requirements for right-of-way width are summarized in Table 2-3.

**Improvement Plans**

The responsibilities for maintenance and construction of highways within Levy County are divided among state, county and municipal governments.

**FDOT**

Correspondence with the FDOT office in Lake City indicates several items in the five-year work program for Levy County. The significant items are listed in Table 2-6.

**Levy County**

Levy County has no plans for the construction of new roads until all existing major roads are upgraded to acceptable standards.

1. Appendix E, Guidelines On Construction Constrained Facilities, Florida's Level Of Service Standards And Guidelines Manual For Planning, Florida Department of Transportation, January 1, 1989.

**Construction Constrained Facility**

This is a facility which is defined as: "... one in which adding two or more through lanes to meet current or future traffic needs, is not possible because of physical or policy barriers". 1. To be consistent with Department of Transportation policies, Levy County must:

- (1) List and map any construction constrained facilities.
- (2) Include policies and strategies to ensure the level of service on these facilities is maintained at the operating condition existing at the time of adoption of the plan.

**Backlogged Facility**

The Florida Department of Transportation [FDOT] defines a backlogged facility as "A state roadway, at least 0.2 miles in length, operating at a level of service below the Department's statewide adopted minimum operating level of service standards for its functional classification; a state road that is not in the Department's Five Year Work Program and has not been determined by FDOT to be a constrained facility.

**Airports**

Levy County is served by two public airports: The George T. Lewis Airport and the Williston Municipal Airport [See Map 2-1]. Several private air fields are located in Levy County, but have limited facilities.

**George T. Lewis Airport**

The facility is located on an island one mile west of Cedar Key and is owned by Levy County. The airport has one paved runway which is two thousand four hundred [2,400] feet long and one hundred [100] feet wide. The present role of this airport in the system of airports is primarily that of a facility to serve basic utility itinerant aircraft destined for the resort and recreation activities at Cedar Key. The airport's market area includes Cedar Key, Vista, Sumner and Rosewood. An FAA funded airport master plan is currently being prepared as a preliminary to upgrading this facility.

The following two paragraphs are quoted from the June, 1989 Cedar Key Area Comprehensive Plan:

"The Cedar Key area is fortunate to have a general aviation airport less than one [1] mile west of the Cedar Key City limits. Opened in 1936, the George T. Lewis Airport was used as an air/sea rescue base during and after World War II. The runway is approximately 2,400 feet long and 100 feet wide. It has landing lights to permit non-daylight landings and is cited in the Department of Transportation 5-Year Construction Plan to receive visual aids. Installation got under way in December 1988. There are 14 aircraft tiedowns and 2,000 square yards of apron area.

The Levy County Comprehensive Plan contains policies which would consider relocation of a threatened infrastructure to an inland site. The WRPC Hurricane Loss Prevention Study, however, states that the Cedar Key Airport is not a major facility, "thus relocation would not be deemed necessary". In addition, a major negative economic impact to the Cedar Key area would result from

relocation of this facility.”

Regardless of the relocation issue, the Board is required by Chapter 9J-5.012(2)(e)3 to inventory threatened infrastructure located within the coastal high-hazard area; and, “The potential for relocating threatened infrastructure shall be analyzed”. This is accomplished within Chapter 4 of this plan.

TABLE 2-1

CONDITION SUMMARY OF MAJOR COLLECTORS, LEVY COUNTY (As of February 1987)

State or County Route Number	Pavement Right-of-Way			Pavement 2/ Condition
	Length 1/ Miles	Width 1/ Feet	Width 1/ Feet	
CR 347 FM SR 24 at Lukens Vista, N. to CR 330	20.1	18'	80'	Poor
CR 347 FM 330, E. to SR 55	9.5	18'	100'	Good
CR 347 FM SR 55, N. to SR 500	4.01	18'	80'	Good
CR 347 FM CR 346, N. to Gilchrist County	2.5	18'	80'	Fair
CR 332 FM CR 336, E. to CR 345	2.01	18'	80'	Good
CR 345 FM SR 500, N. to SR 49 & E. to CR 339	7.6	18'	80'	Good (1/3) Poor (2/3)
CR 345 FM SR 24, to CR 332 in Chiefland	12.61	20'	66.46'	Good
CR 322 FM SR 45 at Montbrooks, E. to Marion County	3	18'	80'	Good
CR 330 FM CR 347, E. & S. to CR 336	11.2	18'	80'	Good
CR 336 FM CR 347, S. & E. to SR 345	4.02	18'	80'	Fair
CR 336 FM SR 345, S. & E. to SR 24	7.3	18'	80'	Poor
CR 336 FM SR 55, to Marion Co. line	9	22'	100'	Fair
CR 341 FM 345 W. of Chiefland, N. to Gilchrist Co.	8.02	18'	80'	Good

Levy County Comprehensive Plan

Data & Analysis

CR 341 FM 336, N. to SR 345 in Chiefland	7.5	18'	60', 80'	Good
CR 40 FM Inglis, E. to Marion Co.	6	20'	100'	Fair
CR 337 FM SR 121, S. to CR 336	6.4	18'	80'	Good
CR 337 FM SR 121, N. through Bronson to Alachua County	23.2	18'	100'	Poor to Good
CR 326 FM Gulf of Mexico, E. to CR 347	3.34	18'	100'	Fair
CR 326 FM Gulf Hammock (SR55), E. to SR 45	18.24	18'	100'	Good
CR 326 FM SR 55, SW to Wacassassa River County Park	3.83	18'	80'	Fair
CR 326 FM SR 45 at Morriston, E. to Marion County	2.7	18'	80'	Good
CR 241 FM SR 500, N. to Alachua County	5.1	18'	80'	Bad
CR 343 FM CR 326, N & E to CR 337	10.22	18'	100'	Fair
CR 343 FM CR 241, E. to SR 45	4.14	18'	80'	Good
SR 339 FM SR 500, NE to Gilchrist County	10.4	18'	100'	Good
CR 321 FM SR 49 in Chiefland, N. to CR 346A	4.97	18'	80'	Good
CR 346A FM SR 55, E. to SR 339	8.5	18'	80'	Poor
CR 346 FM SR 55, E. to SR 49	4.1	18'	80'	Good
CR 346 FM SR 49, E. to SR 339	4	18'	80'	Fair
CR 320 FM SR 55, E. to SR 339	8.7	18'	80'	Fair
CR 320 FM SR 121 E. to Marion County	0.51	16'	60'	Bad
CR 339A FM SR 500, SW for 3 miles	2.19	18'	80'	Good
CR 339A FM SR 500, N. to CR 320	2	18'	80'	Good
CR 335 FM SR 500, E. to SR 45	8.2	18'	100'	Good

Levy County Comprehensive Plan

Data & Analysis

CR 335 FM SR 45 at Raleigh, E. & S. to SR 500	9	18'	66'/ 80'	Good/Fair
CR 316 FM CR 337, N.&E. To SR 121	7.94	18'	100'	Good
CR 316 FM SR 45, S. to Williston, E. to CR 335	3.04	18'	80'	Fair
CR 335A FM SR 121, W. of Williston, N. to CR 343	3.2	18'	80'	Fair
CR 331A FM SR 500, E. of Williston, N. to SR 121	1.83	18'	80'	Good
CR 318A FM SR 500 in Williston, E. to CR 331A	1.25	18'	80'	Good
CR 323 FM SR 45 at Morriston, N. & E. to CR 322	4.54	18'	80'	Good
CR 323 FM SR 322, N. to SR 500 in Williston	4.03	18'	68'/ 80'	Good
CR 326 FM SR 45 at Morriston, E. to Marion County	2.7	18'	66'	Good
CR 464 FM 45 E. to Marion Co.	2.3	18'	100'	Good
CR 464 FM SR 121, E. to SR 45				

Source: 1/ Florida Department of Transportation  
 2/ Levy County Superintendent of Roads

TABLE 2-2

**TRAFFIC VOLUMES AND PROJECTIONS FOR MAJOR HIGHWAYS IN LEVY COUNTY**  
(Average Annual Daily Traffic Count - AADT)

Station #	Location	ADT 1983	6-Year % Increase 1978-1983	Annual Increase 1978-1986	ADT 1986	3-Year % Increase 1983-1986	Projections 1995	Projections 2010
8	SR 24 SW of SR 345	990	26%	60.6	1,270	22	1,815	3,088
10	US 19 N. of SR 24	3,395	7%	112.5	4,000	15	5,013	6,700
16	US 19 N. of SR 336	3,184	24%	71.6	3,809	16	4,453	5,527
30	US 19 N. City Limits of Inglis	3,624	25%	137	4,528	20	5,761	7,816
69	US 19 S. City Limits of Inglis	6,015	22%	294	7,119	16	9,765	14,175
31	SR 40 E. City Limits of Inglis	1,288	6%	41.7	1,544	17	1,919	2,545
33	SR 24, NE of SR 345	781	45%	33	807	3	1,104	1,599
39	SR 45, S. of SR 326	2,004	3%	146.5	2,762	27	4,081	6,278
84	SR 121, W. of SR 45	2,312	33%	260.6	3,790	39	6,135	10,044
86	SR 212, NE of SR 55	611	27%	32.8	723	15	1,018	1,510
102	US 19 NW City Limits of Chiefland	7,691	4%	204	9,016	15	10,852	13,912
112	US 27 E. City Limits of Chiefland	3,498	17%	8	3,058	-14	3,130	3,250
113	US 19 S. City Limits of Chiefland	3,353	3%	33.5	3,518	5	3,820	8,142
116	US 27 NW of SR 24	3,090	0%	124	4,073	24	5,189	12,238
117	SR 24 NE City Limits of Williston	1,907	54%	116	2,140	11	3,184	8,108

122	US 27 W City Limits of Williston	4,524	26%	206.6	5,236	14	7,095	7,794
125	SR 24 NE of US 27, Bronson	2,164	69%	122	2,257	4	3,355	8,540
132	US 27 E City Limits of Bronson	4,062	24%	218	5,009	19	6,971	10,241
133	US 27 SE of SR 318	4,297	21%	207	5,221	18	7,084	10,189
139	US 27 W. CSX Trans. Williston	10,383	22%	517	12,623	18	17,276	25,031
143	US 41, S. City Limits of Williston	3,976	23%	192	4,775	17	6,503	9,383
150	SR 45, N. City limits of Williston	1,870	2%	130.7	2,886	35	4,062	6,023
152	SR 40 W. City Limits of Inglis	1,817	-12%	-5.7	2,014	10	1,962	1,877
155	SR 24 N City Limits of Cedar Key	1,314	1%	18	1,841	29	2,453	3,473
168	SR 345 W. City Limits of Chiefland	1,380	1%	18	1,524	9	1,686	1,956
224	SR 24 NE of US 27, Otter Creek	844	30%	43.8	1,001	15	1,395	2,052
226	SR 212, NE City Limits of Williston	2,497	41%	171	3,140	20	4,679	7,244
228	US 27 E. City Limits of Williston	6,161	14%	291.7	8,495	27	11,120	15,496
236	SR 320, W SR 55	2,025	23%	62	2,524	20	3,082	4,012
240	S. 337, N of SR 24	722	83%	37.6	711	-2	1,049	1,613

**Levy County Comprehensive Plan****Data & Analysis**

241	S. 337, S of US 27	1,101	60%	53.8	1,181	7	1,665	2,472
254	S. 341, SR 320	823	2%	17	944	13	1,097	1,352
275	S. 341, S of SR 345	385	20%	20.7	491	22	677	988
270	S. 331A N. of SR 318	1,067	--	16.7	1,314	19	1,464	1,715

**Average Increase 22.6%****14.2%**

Source: Florida Department of Transportation, Lake City office, Historic Counts Data.  
Central Florida Planning and Development Corporation, July 1987.

TABLE 2-2A

**TRAFFIC VOLUMES AND PROJECTIONS FOR MAJOR HIGHWAYS IN LEVY COUNTY  
BASED UPON 1983 TO 1988 TRAFFIC COUNTS**

Station	Existing Lanes if not 2	ADT 1983	ADT 1988	5-Year Change Number	Annual Change Percent	Projections 1995	Projections 2020
8		990	1,265	275	6%	1,796	3,412
10		3,395	3,260	135	2%*	3,716*	4,830
16		3,184	3,575	391	2%	4,075	5,298
30	4	3,624	4,480	856	5%	6,048	10,584
69	4	6,015	8,295	2,280	8%	12,940	28,468
31		1,288	2,490	1,202	12%	4,581	12,826
33		781	890	109	3%	1,076	1,560
39		2,004	2,485	481	5%	3,355	5,871
84		2,312	3,205	893	8%	5,000	11,000
86		611	830	219	7%	1,236	2,534
102	4	7,691	9,910	2,219	6%	14,072	26,737
112		3,498	4,455	957	5%	6,014	10,524
113	4	3,353	3,245	108	1%*	3,472*	3,992*
116		3,090	4,015	925	6%	5,701	10,832
117		1,907	2,650	743	8%	4,134	9,095
122		4,524	6,145	1,621	7%	9,156	18,770
125		2,164	2,820	656	6%	4,004	7,608
132		4,062	5,055	993	5%	6,824	11,942
133		4,297	5,495	1,198	6%	7,803	14,826
139	4	10,383	13,170	2,787	5%	17,779	31,113
143		3,976	520	1,304	6%	7,498	14,246

150		1,820	2,705	835	9%	4,409	10,361
152		1,817	2,245	428	5%	3,031	5,304
155		1,314	1,635	321	5%	2,207	3,862
168		1,380	1,900	520	8%	2,964	6,521
224		844	995	151	4%	1,274	2,038
226		2,497	4,770	2,273	10%*	3,864*	9,660
228	4	6,161	8,845	2,684	9%	14,417	33,159
236		2,025	2,940	915	9%	4,792	11,261
240		722	950	228	6%	1,349	2,563
241		1,101	1,415	314	6%	2,009	3,817
254		823	1,135	312	8%	1,771	3,896
275		385	500	115	6%	710	1,349
270		1,067	1,790	723	10%*	1,229*	3,072

\* Based upon average of 1983 to 1986 and 1983 to 1988

MAP 2-2

HISTORIC TRAFFIC VOLUMES

The Board concurs that relocation of the George T. Lewis Airport might have a negative economic impact on Cedar Key, and it is the intent of the Board to maintain and operate the airport in its present location, unless and until relocation is mandated or found to have public benefits that outweigh any negative economic impacts.

TABLE 2-3

**MINIMUM REQUIREMENTS FOR RIGHT-OF-WAY AND PAVEMENT WIDTHS  
LEVY COUNTY**

Classification	Minimum Right-of-Way	Minimum Pavement Length
Arterial	180 ft. 4 lane	12 ft. per lane
	100 ft. 2 lane	12 ft. per lane
Collector	80 ft.	20 ft. total
Local	60 ft.	20 ft. total

Source: Levy County Subdivision Regulations

TABLE 2-4

**ROAD EXPANSION PROJECTIONS FOR SELECTED PORTIONS  
OF LEVY COUNTY ROADS**

Road	Location	Average Percent ADT 1986	Annual Increase 1983-1986	Year ADT Projected to Exceed 10,000
US 27	E Bronson	5,009	6.33%	1,998
US 27	W Bronson	5,236	4.67%	2,001
US 27	.25 mi SE of SR 318	5,221	6.00%	1,998
US 27	E Williston	8,495	9.00%	1,989
SR 34	NE Bronson	2,140	2.66%	2,229

Source: Central Florida Planning and Development Corporation, June, 1987.

**Williston Municipal Airport**

A former military airport, this facility was deeded to the City of Williston in 1974. The airport is located two miles southwest of downtown Williston and has two asphalt surfaced runways. Runway 4/22 is 7,000 feet in length, and runway 14/32 is 5,000 feet long. Both runways have 150 feet widths. The airport serves as a basic utility airport with a market area that includes Williston, Bronson, Reddick, McIntosh and Archer. The City of Williston has prepared an airport master plan and an industrial site plan for this facility; and, the property was annexed in 1988. In 1992, this airport was selected as the preferred location for a regional airport within 20 miles.

**Railroads**

Levy County is served by CSX Transportation, formerly Seaboard Coastline Railroad. The routes of CSX Transportation extend north-south to Chiefland along the eastern section of the county through Williston. Railroad freight service is provided in Chiefland and Williston, with a depot in Williston.

Trains routed through Williston connect with the main line at Dunnellon. Some under-utilized section have been or are in the process of being abandoned by the railroad.

**Bus Service**

Levy County is provided with bus service by Greyhound and Trailway Bus Lines. There are nine northbound and eight southbound buses daily, and freight service is provided on both lines. Greyhound Bus Lines has one depot in Levy County, at Fanning Springs. Both Greyhound and Trailways Bus Lines have flag stops at Chiefland, Bronson, Williston, Lebanon Station, Otter Creek and Gulf Hammock.

**Trucking**

Three trucking firms currently serve Levy County. MR&R Trucking Company, Central Trucklines and Consolidated Freight Ways. United Parcel Service (UPS) and Federal Express also provide daily pickup and delivery services.

**Bicycle and Pedestrian Ways**

There are no designated, county-constructed or maintained bicycle or pedestrian ways in unincorporated Levy County. There are no state or federal bicycle or pedestrian ways in unincorporated Levy County. No studies have been conducted to determine the need for such facilities, and the board has never received a request to either consider of to construct such facilities.

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**Existing Traffic System Use**

Levy County's dispersed population rarely gathers on its traffic system so as to create congested conditions. Tourist and commercial traffic crossing the county are not intensive enough to aggravate the situation to any significant extent. Sergeant Herman Allen of the Levy County Sheriff's Office notes that the only time traffic jams occur is when construction and maintenance activities or traffic accidents impede traffic flow.

### Current Traffic Needs

Traffic circulation levels are reflected in the estimates of the average daily trips (ADTs) listed for major roads in Levy County in Table 2-2. The average increases in traffic volumes on county roads over five years (1978-1983) of 22.6% and the three subsequent years (14.2%) are not significant enough to signal any need for change. This is so because traffic volumes were initially so low that relatively small increases in traffic flow appear as large increases percentage-wise.

A case in point might be State Route 24 northeast of Bronson. Monitors showed a 69% increase in traffic flow from 1978-1983, but that traffic volume is still one-quarter of what the Florida Department of Transportation would consider necessary for expanding SR 24 from a two-lane to a four-lane road. When one considers that the scarcity of job and shopping opportunities in rural Levy County forces a significant portion of county residents to drive into Gainesville on SR 24, it is evident that even on the major arterials, demand is not outstripping use.

### Traffic Accident Statistics

The same necessities, such as job, shopping and entertainment opportunities, which pull Levy County's most rural population long distances into such regional population centers as Gainesville and Ocala, unfortunately seem to contribute a relatively high number of accidents and fatalities for the county.

While Levy County ranked 55th out of sixty-seven [67] counties in Floridian population density in 1984 [Florida Statistical Abstract 1985], it tied for 45th in total fatalities and 44th in total accidents. This supports the contention [Mr. Sandiego Sanchez of the Florida Department of Highway Safety and Motor Vehicles], that the long distances traveled by Levy County residents at early morning or late night hours either to work or following entertainment, contributes to proportionately higher traffic deaths per capita. [See Table 2-5]

### Transportation System Needs Analysis

The following analyses were based on discussions with the Department of Transportation, and comparisons between existing conditions and accepted standards. Most problem areas concern the highway network; however, deficiencies of airport facilities are also discussed.

### State-Identified Needs And Plans

In "The Strategic Transportation Plan 1988", the Florida Department of Transportation addresses Levy County as a part of the District Two Plan. The ten year needs plan states: "The new inter-regional system includes upgrading the U.S. 19 corridor from the proposed extension of the Florida Turnpike to Georgia." The plan also states: "Aviation support and a regional airport for the Gainesville - Ocala area are proposed."

Map 2-3 shows the District Two Plan. Activities shown include the 5-Year Work Program which ends in 1994. By time frame, major activities include:

**1989-1998.**

- (1) U.S. 19 and C.R. 336. New expressway, with corridor acquisition.
- (2) U.S. 27A, add lanes from Bronson southeast to Marion County.

**1999-2008.**

- (1) U.S. 27A, add lanes from Bronson northwest to Chiefland.

TABLE 2-5

TRAFFIC ACCIDENTS IN THE LEVY COUNTY REGION

Year	Jurisdiction	Mileage Death Rate	Persons Killed	Persons Injured	Total Accidents Reported	Fatal Accidents	% Fatal Accidents	Total Accidents Reported	Fatal Accidents	Fatal Accidents	Non-Fatal Accidents Reported	% of Complete Reported	% of Rural Reporting by FHP
1980	Levy	5.3	10	250	403	8	2.0	403	8	8	395	90	68
1980	Florida	3.8	2,879	201,385	357,720	2,571	0.7	130,592	1,519	1,519	129,073	154	66
1981	Levy	5.2	11	259	436	10	2.3	436	10	10	426	77	74
1981	Florida	4.1	3,199	205,437	368,766	2,810	0.8	133,565	1,643	1,643	131,922	146	68
1982	Levy	3.8	9	282	437	9	2.1	437	9	9	428	86	73
1982	Florida	3.4	2,710	195,834	361,312	2,454	0.7	133,541	1,398	1,398	132,143	172	69
1983	Levy	3.2	7	325	474	7	1.5	474	7	7	467	121	73
1983	Florida	3.3	2,729	194,791	384,614	2,460	0.6	149,936	1,395	1,395	148,541	194	67
1984	Levy	3.6	8	290	288	8	2.8	288	8	8	280	64	73
1984	Florida	3.4	2,856	202,889	237,551	2,599	1.1	91,703	1,498	1,498	90,205	109	69
1985	Levy	4.8	11	303	297	9	3.0	297	9	9	288	58	76
1985	Florida	3.3	2,870	216,596	250,412	2,589	1.0	102,177	1,559	1,559	100,618	117	65

Note: Mileage death rate = number of deaths per 100 million vehicle miles.

Source: Florida Department of Highway Safety and Motor Vehicles, Division of Florida Highway Patrol, Bureau of Records and Training, Traffic Homicide and Records Section: "Traffic Accidents Facts".

### Highways In General

As all roads are operating at or below their designed capacity, there are not any immediate needs for upgrading. However, since nearly one half, 45.5%,<sup>1</sup> of all employed residents residing in Levy County commute out of the county to work, special attention should be given to those roads with high peak hour traffic volume.

Based on projected traffic volumes for roads within Levy County, Table 2-2, and the design capacity of these roads, U.S. 27A east of Williston will approach or reach capacity during the initial planning period; i.e. by 1995. By the end of the second planning period, 2020, the following roads are expected to require 4-laning:

- (1) S.R. 40 East of Inglis
- (2) S.R. 121, West of S.R. 45/U.S. 41, Southwest of Williston
- (3) U.S. 27, East of Chiefland
- (4) U.S. 27, Northwest of S.R. 24, Northwest of Bronson
- (5) S.R. 24, Northeast of Bronson
- (6) U.S. 27, West of Williston
- (7) U.S. 27, East of Bronson
- (8) U.S. 27, from Williston to Marion County
- (9) U.S. 41, South of Williston
- (10) U.S. 41/S.R. 45, North of Williston
- (11) S.R. 320, Northwest of Chiefland

Primary needs of the highway network in Levy County include the following areas: re-surfacing and widening needs; subdivision regulation needs; construction needs; right-of-way needs; and conflicts between the existing transportation system and land uses.

1. \_\_\_\_\_ Levy Overall Economic Development Plan Update, 1988. Central Florida Planning and Development, a division of Forestry and Environmental Services, Inc., 1988.

MAP 2-3

COMBINED DOT WORK PROGRAM  
AND  
DISTRICT TWO PLAN

**Resurfacing And Widening Needs**

Between 1978 and 1982, Levy County made excellent progress in upgrading the road system. Successive freezes during the winters of 1983 and 1984, however, have severely damaged many of the roads. A second problem of the existing highway network concerns pavement widths. Pavement widths on the majority of collectors are below recommended standards of 22-24 feet. If traffic volumes increase at a higher rate than projected, certain collectors may require widening to maintain required capacity and satisfy safety requirements. As shown in Table 2-1, some 77.7 miles of country roads are in fair condition and require re-surfacing within five years; 64.2 miles [poor condition] require re-surfacing within three years; and 12.5 miles [bad condition] require re-surfacing within one year.

By 2010, C.R. 121 and U.S. Highway 41 will be approaching and possibly be exceeding their design capacity thus requiring widening. These roads are heavily used by residents in Dunnellon and Williston who work in Alachua County.

**Subdivision Regulation Needs**

Upgraded as a part of the codification process during 1983-1984, the Levy County subdivision regulations are considered adequate to meet current needs. Subdivisions of lots below five acres in size require paved roads according to county standards, and subdivisions having lots equal to or greater than five acres may generally have unpaved roads which conform to minimum county standards, and, which are a part of a Municipal Service Taxing Unit [MSTU] established by the developer.

**Construction Needs**

Based on current and projected requirements, the county's existing system of arterials and collectors is sufficient to meet the county's needs in the foreseeable future. No new arterials or collectors are proposed.

**Right-of-Way Needs**

Right-of-way widths of most collectors in Levy County are less than recommended. Right-of-way widths range from fifty [50] to one hundred [100] feet compared to a recommended standard of one hundred [100] to one hundred twenty [120] feet. As more development occurs in the county and traffic volumes increase, certain collectors may require widening. Acquisition or dedication of additional right-of-way cannot be acquired through dedication, condemnation may be the only means of acquisition. Such procedures are both time consuming and costly and should be avoided when possible.

Although no new collectors are required at this time, adequate right-of-way widths should be reserved for future requirements. Consideration should be given to establishing future collectors along section lines or quarter section lines to facilitate development of a grid system.

**Conflicts Between Existing Transportation System And Land Use**

Levy County is predominately a rural county and has not experienced serious conflicts between the existing transportation system and land uses. However, commercial strip development is beginning to occur along arterial highways. Failure to regulate this type of development usually results in conflicting traffic conditions, a proliferation of signs, depressed property values and a variety of building setbacks.

**Projected Traffic Circulation Levels And Needs**

Levy County's lack of industry and major exploitable tourist attractions, such as usable shoreline, means that there are no powerful magnets for attracting new residents. Growth is occurring at a modest rate of 1.6% which reflects the intrinsic rate of increase [birth rate] plus some immigration less those emigrating to seek jobs. Such growth rate does not appear to necessitate much expansion of the transportation system within the next ten [10] years.

Other factors also contribute to the fairly secure transportation base which Levy County has. The climate is mild, and frequent freezes do not occur, so that roads usually are not cracked by frost heaves. Since the topography has a shallow relief, there is little washout of roads. Finally, commercial and tourist traffic is relatively light in that Levy County does not straddle major commerce or tourist routes. This reality is reflected in the fact that the Future Land Use Map for Levy County is hardly different at all from the present land use map. Changes in agriculture may occur, but the county is predominately rural, wet and forested, and the forces of economic growth and expansion are too weak to promote any major new transportation needs within the next five [5] to ten [10] years.

Table 2-4 shows projections of when expansion from two to four lanes may be required for parts of Routes 27 and 24. These projections are based on the assumption by the Florida D.O.T. that ten thousand [10,000] to twelve thousand [12,000] trips per day requires the four-laning of a two-lane road. As can be seen, except for parts of S.R. 27 southeast of Williston, most such expansions are at least ten years away. At current rates of traffic volume increase, S.R. 24 would not be four-laned for at least forty years. This general lack of need to construct is also seen in Table 2-6. Florida D.O.T. foresees mostly signal modernization and bridge rehabilitation in its five-year construction plan.

If Williston Airport becomes a regional airport, the design capacity of roads leading into and out of the city will need to be increased. Traffic volume will increase significantly above the current capacity of the two-laned roads. These roads will need to maintain their functional classification and upgrading will be necessary.

TABLE 2-6

## FLORIDA D.O.T. ANTICIPATED CONSTRUCTION COSTS IN LEVY COUNTY

Road	Improvement	Cost (\$1,000)	Year
Williston Airport	Construct Apron	580	88/89
Williston Airport	Visual Aids Installation	20	90/91
Williston Airport	Construct Hanger	100	87/88
Williston Airport	Construct Hanger	100	88/89
Williston Airport	Overlay Taxiway	300	87/88
Cedar Key Airport	Visual Aids Installation	20	87/88
S.R. 55 / US 19 from CR 40 in Inglis to Signal Upgrade	Traffic Signals	38	88/89
US 19 Bridges #340037 & #42	Bridge Rehabilitation	18	87/88
S.R. 55 from C.R. 326 to Gulf Hammock	Upgrade Flashing Beacon	43	89/90
SR 55 from SR 24 to Otter Creek	Upgrade Flashing Beacon	22	89/90

Source: Florida Department of Transportation,  
*Five Year Construction Plan 1987-88 (FY 88) through 1991-92 (FY 92).*

**Level Of Service**

The projected level of service for all roads within Levy County will remain at a level of "C" based on projected traffic volumes, through the initial planning period.

In summary, the projected needs for transportation in Levy County consist primarily of the widening and re-surfacing which is listed in Table 2-1, with the conversion of U.S. 19/98 - C.R. 336 to an expressway.

Summary of Traffic Conditions at the Time of the EAR

Existing Traffic Circulation Data

The Existing Traffic Circulation Map

Not Available.

FDOT Functional Classifications

Unchanged. The following FDOT functional classifications were depicted on the Existing Highway Functional Classification Map.

<b>Expressway</b>	
CR 336	
<b>Principal Arterials</b>	<b>Minor Arterials</b>
U.S. 41	SR 121
U.S. 27-Alternate	SR 24
U.S. 19/98	CR 320
U.S. 129	
<b>Rural Major Collector Roads</b>	<b>Rural Minor Collector Roads</b>
CR 40	CR 347
CR 464	CR 345
CR 323	CR 339
CR 318	CR 337
CR 335-A	CR 326
CR 316	CR 335
CR 336	CR 241
	CR 40 West of Yankeetown to the Gulf

Limited Access Facilities

Unchanged.

This condition could change if the terminus of the Florida Turnpike is relocated to Lebanon Station as suggested in current plans. However, the alignment of the Turnpike extension is still subject to change.

Number of Traffic Lanes for Each Roadway

The width and conditions in 1996 of the county-maintained road system are presented in Table 2-1 in the Appendix to Part 2 of this EAR. Laneage for state-maintained highways is presented in ADT tables (Table 2-4) and in Table-set 2-6, Existing and Projected LOS for FIHS and SHS in Levy County in the Appendix.

Ports and Related Facilities

Unchanged. Ports and related facilities were not addressed in the Traffic Circulation element.

Airports and Related Facilities

Airport Master Plan updates were prepared for the airports at Cedar Key and Williston. The draft Master Plan for the Cedar Key Airport was under review by the FDOT at the time of the preparation of the EAR.

High Speed Rail Lines and Related Facilities

Unchanged. While high speed rail lines were not addressed in the Traffic Circulation Element, Levy County is served by CSX Transportation, formerly the Seaboard Coastline Railroad. The Routes extend north-south to Chiefland and along the eastern section of the county through Williston. Railroad freight service was provided in Chiefland and Williston, with a depot at Williston. Trains routed through Williston connected with the main line at Dunnellon. Some under-utilized section has been or were in the process of being abandoned by the railroad. (LCCP: 2-11)

Traffic Circulation Analysis, Existing Levels of Service

All roads in the unincorporated part of the county were designated at Level of Service "C" (See Table-set 2-6 in the Appendix to Part 2) at the time of the EAR. Actual operating LOS were generally higher. No moratoria were imposed by the County due to inadequate Levels of Service. An inter-local agreement between the County and the FDOT to assure that Principal Arterials would be maintained at or above Level of Service "C" was not entered into during the planning period.

Design Capacities

Not available.

Estimates of ADT

Average Daily Traffic volumes were obtained from the FDOT; actual ADT's were presented for 27 traffic count stations on the state highway system in Levy County for the years 1990 through 1995. According to Average Daily Traffic Volumes and actual observation, all roads in the unincorporated part of the County were operating at the Level of Service "C" or higher. ADT's are presented in Table 2-4 in the Appendix to Part 2 of this EAR.

Accident Frequency Data

Accident frequency data indicated the following about traffic mishaps in Levy County between 1990 and 1994 are presented in Table 2-5 in the Appendix to Part 2 of this EAR.

Existing Facilities Needs/Expansions, State/Federal Highways

Facilities slated for upgrade for expansion are listed in the current FDOT Work Program for Levy County (including incorporated areas). These upgrade/expansion projects for the next five fiscal years are listed in Table 2-2 in the Appendix to Part 2 of this EAR.

County Roads

Facilities in need of upgrades and expansions are inventoried in the current list of capital and road projects obtained from the Levy County Road Department in June, 1996. Note there is overlap with the FDOT Work Program since some local improvements are funded in whole or in part by state and federal highway funds. The County Work Program is presented in Table 2-3 in the Appendix to Part 2 of this EAR.

# LEVY COUNTY

(as of 12/10/2009)

## Construction is Underway

**County Road 40** Resurfacing from Ball Park Road to Peaceful Acres Road (Southeast 116<sup>th</sup> Avenue) (3.5 miles). D.A.B. Constructors, Inc., of Inglis began November 23, 2009 and should finish in 90 days at a cost of \$693,000. This is a federal economic stimulus funded project. William McQuaig of Target Engineering is CEI project manager. Frank Suarez/FDOT project manager. (4262271)

**U.S. 19** Resurfacing and paving shoulders from Lebanon Station to State Road 24 in Otter Creek (14.2 miles). Anderson Columbia Company Inc., of Lake City began March 30, 2009 and should finish in 250 days (late 2009) at a cost of \$8,247,337.92. Jon Doke of KCCS is CEI project manager (352-486-6960). Fred Wright/FDOT project manager. (2103764, 2103766)

## Construction is Imminent

**Manatee Springs Bike Trail** Construct bike path along both sides of State Road 320 from just east of the Manatee Springs State Park entrance to the existing bike path (5.5 miles). From the existing bike path to U.S. 19, 5-foot paved shoulders will be added (.18 mile). Total distance is 5.7 miles. Also, within the park property there will be a turnaround and various driveways built. V.E. Whitehurst & Sons of Williston should begin January 4, 2010 and finish in 200 days at a cost of \$1,388,377.30. This is a design/build project and is funded with federal economic stimulus funding. William McQuaig of Target Engineering is CEI project manager. Frank Suarez/FDOT project manager. (4263971)

**U.S. 19** Resurface and pave shoulders from State Road 24 in Otter Creek to just south of Southeast Fourth Street in Chiefland (11 miles). APAC-Southeast, Inc., of Gainesville should begin in January 2010 and finish in 250 days (Fall of 2010) at a cost of \$7,265,411.53. (2103763, 2103767)

## Projects in Five-Year Work Program

**County Road 207 (Old Fannin Road)** Resurface from County Road 341 to U.S. 19 (7.3 miles) in 2009/10 at estimated cost of \$2.1 million. (424180)

**County Road 316 (Southeast 12<sup>th</sup> Avenue)** Modify intersection to make safety improvements at County Road 323 (Northeast 200<sup>th</sup> Avenue). Bids to open in January 2010 at estimated cost of \$651,000. (2124183)

**County Road 316** Resurface from U.S. 41 to Alternate U.S. 27 (2.4 miles) in 2010/11 at estimated cost of \$1.6 million. (4243581)

**County Road 331A** Build sidewalk from County Road 318 to Northeast Fourth Avenue in 2010/11 at estimated \$253,000. Jordan Green/project manager. (2124252)

**U.S. 27A** Resurface from 10<sup>th</sup> Street in Williston to the Marion County line (3 miles) in 2010/11 at estimated cost of \$3 million. (2104634)

**U.S. 41** Add left turn lanes at County Road 326 in 2010/11 at estimated \$2 million. (2104324)

**Recently Completed Projects  
(within the past year)**

**County Road 159 (Northeast 140<sup>th</sup> Court/Olive Drive)** Added a 5-foot wide sidewalk from U.S. 27A to Northeast 49<sup>th</sup> Lane. Santa Cruz Construction Inc., of Merritt Island began February 9, 2009 and finished March 7, 2009 at a cost of \$165,097.00. (2124803)

**State Road 121** Resurfaced from U.S. 41 to the Alachua County line (7 miles). Anderson Columbia Company Inc., of Lake City began March 9, 2009 and finished September 14, 2009 at a cost of \$3,360,682.02. (2103792)

**U.S. 19** Resurfaced from Southwest 14<sup>th</sup> Avenue to Rodgers Boulevard in Chiefland (2.5 miles). Also, upgraded traffic signals at Northwest Fourth Street in Chiefland. Anderson Columbia Company, Inc., of Lake City began February 16, 2009 and finished August 26, 2009 at a cost of \$2,215,398.23. (2103768, 2104284)

**U.S. 19** – Landscaped from State Road 320 to Southwest 14<sup>th</sup> Avenue in city of Chiefland. Garden World of Holiday, Inc., of Land O' Lakes began January 15, 2009 and finished January 31, 2009 at a cost of \$40,470.32. (2104683)

**Projects Under Consideration**

**County Road 339** Purchase right of way to replace the bridge over Waccasassa River in 2011/12 at estimated \$116,000. (2117281)

**State Road 24** Begin design to replace the bridge over Havens Creek in 2010/11. (2103844)

**LEVY COUNTY**

Item No	Project Description	Work Description	Length	2010	2011	2012	2013	2014
<b>Highways: State Highways</b>								
Item No	Project Description	Work Description	Length	2010	2011	2012	2013	2014
4130251	DD-LEVY COUNTY TRAFFIC LIGHTING MAINTENANCE	TRAFFIC CONTROL DEVICES SYSTEM	.000	26 OPS	25 OPS	26 OPS	26 OPS	27 OPS
2103762	SR 121 FROM US 41 TO ALACHUA, FL	RESURFACING	7.132	274 CST				
2103844	SR 24 AT HAVENS CREEK BR 3400583 & 3400003	BRIDGE REPAIR/REHABILITATION	1.197		176 PE			
4233971	SR 320 FROM: MANATEE SPRINGS TO: US 19 (SR 85)	BIKE PATH/TRAIL	5.784	2,525 DSB				
2104324	SR 42 @ CR 326	ADD LEFT TURN LANES(S)	300	1,898 CST				
2104634	SR 500 (US 27) FROM SE 10TH STREET TO MARION C/L	RESURFACING	2.655	170 FRU	2,383 CST			
2104824	SR 55 (US 19) @ NW 4TH ST IN CHIEFLAND	TRAFFIC SIGNAL UPDATE	.704	1 CST				
2103766	SR 55 (US 19) FROM BEG OF CURB & GUTTER TO US 129 (CHIEFLAND)	RESURFACING	1.518	412 CST				
2103766	SR 55 (US 19) FROM LEBANON STATION TO OTTER CREEK	PAVE SHOULDERS	14.195	48 CST				
2103764	SR 55 (US 19) FROM LEBANON STATION TO SR 24 (OTTER CREEK)	RESURFACING	14.195	10 CST				
2103767	SR 55 (US 19) FROM OTTER CREEK TO CHIEFLAND	SAFETY PROJECT	11.002	2,246 CST	44 CST			
2103765	SR 55 (US 19) FROM SR 24 (OTTER CREEK) TO BEG OF CURB & GUTTER	RESURFACING	11.002	9,194 CST				
2103762	SR 55 (US 19) FROM INGLIS (LEVY CAL) TO LEBANON STATION	RESURFACING	9.831	86 CST				
2103765	US 19 FROM INGLIS TO LEBANON STATION	PAVE SHOULDERS	9.831	9 CST				
<b>Highways: Local Roads</b>								
Item No	Project Description	Work Description	Length	2010	2011	2012	2013	2014
2124183	CR 316/SE 12TH AVE @ CR 323/NE 200 AVE SAFETY IMPROVEMENTS	INTERSECTION (MODIFY)	756	48 PE				
4241751	CR 32 (NE 90 ST ) FROM SR 500 TO SR 24	WIDEN RESURFACE EXIST LANES	2.554	651 CST				
2124252	CR 331A FROM CR 316 NORTH TO NE 4TH AVE	SIDEWALK	330	37 CST				
2117281	CR 339 WACCASASSA RIVER BRIDGE NO. 346050	BRIDGE REPLACEMENT	.028	53 PE	253 CST	116 ROW		
4262271	CR 40 FROM: PARK STREET TO: MARION C/L	RESURFACING	7.197	1,190 CST				
4241801	CR207(OLD FANNIN RD) FROM CR 341 TO SE 55US 19	WIDEN RESURFACE EXIST LANES	7.298	2,189 CST				
<b>Highways: Off State Hwy Sys/Off Fed Sys</b>								
Item No	Project Description	Work Description	Length	2010	2011	2012	2013	2014
2124803	CR 159 (NE 40TH CT) FROM SR 500 TO NE 48TH LANE	SIDEWALK	.000	147 DSB				
4243581	CR 316 FROM US 41/SR 25 TO ALT. US 27/SR 500	WIDEN RESURFACE EXIST LANES	2.385	1,600 CST				
<b>Public Trans.: Aviation</b>								
Item No	Project Description	Work Description	Length	2010	2011	2012	2013	2014
4251691	WILLISTON DESIGN & REHABILITATE RUNWAY 14/32 PFL0002130	AVIATION PRESERVATION PROJECT	.000				700 CAP	300 CAP
4099223	WILLISTON BULK AIRCRAFT STORAGE HANGAR PFL0005778	AVIATION PRESERVATION PROJECT	.000				250 CAP	
4254711	WILLISTON LIGHT TAXI WAY C & LIGHT AIRCRAFT PARKING APRON PFL0006522	AVIATION CAPACITY PROJECT	.000	200 CAP				
4115783	WILLISTON MUNICIPAL CONSTRUCT NEW TERMINAL PFL0003016	AVIATION PRESERVATION PROJECT	.000	100 CAP				
4258791	WILLISTON REHAB OVERLAY & LIGHT TAXIWAY B , D-1 & E PFL0006522	AVIATION SAFETY PROJECT	.000		300 CAP			
4254701	WILLISTON REHAB OVERLAY EXISTING FBO PARKING LOT & ENT PFL6533	AVIATION REVENUE/OPERATIONAL	.000	200 CAP				
4253401	WILLISTON RELOCATE FUEL TANK & TRUCK PFL0006526	AVIATION REVENUE/OPERATIONAL	.000	100 CAP				
<b>Public Trans.: Transit</b>								
Item No	Project Description	Work Description	Length	2010	2011	2012	2013	2014
4247491	FED 5317 NEW FREEDOM PRG. LEVY CO.-NON URBAN	OPERATING/ADMIN. ASSISTANCE	.000	250 OPS				
4233001	LEVY COUNTY FED SECT 5311 RURAL TRANSIT FUNDING	OPERATING/ADMIN. ASSISTANCE	.000	325 OPS	341 OPS			
4233201	LEVY COUNTY FED SECT 5311 RURAL TRANSIT FUNDING	OPERATING/ADMIN. ASSISTANCE	.000			360 OPS		
4087633	LEVY COUNTY FY06-09 HIGH PRIORITY PROJ #238 BUS & BUS FACILITIES	PURCHASE VEHICLE/EQUIPMENT	.000	250 CAP				

FDOT STANDARD INDEX 301



CR 336

24-HOUR MACHINE COUNTS

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1215003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 15 Westbound Volume for Lane 1

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	0	0	3	0	0	0	1	7	2	3	6	4
30	0	0	0	0	1	2	3	7	3	2	5	5
45	0	0	0	0	0	1	1	6	4	0	6	6
00	0	0	0	0	2	3	5	2	4	6	1	1
Hr Total	0	0	3	0	3	6	10	22	13	11	18	16

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	4	4	0	8	2	6	2	3	0	0	1	0
30	2	2	3	8	7	3	1	2	0	3	2	0
45	5	4	5	5	9	9	2	1	1	0	1	1
00	4	3	1	7	3	4	1	0	0	2	1	0
Hr Total	15	13	9	28	21	22	6	6	1	5	5	1

24 Hour Total : 234  
 AM peak hour begins : 06:45 AM peak volume : 25 Peak hour factor : 0.89  
 PM peak hour begins : 15:00 PM peak volume : 28 Peak hour factor : 0.88

\*\*\*\*\*

Dec 15 Eastbound Volume for Lane 2

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	0	0	0	0	0	2	2	3	4	6	4
30	1	1	0	0	0	2	3	3	12	3	1	3
45	0	0	0	0	0	2	3	2	1	4	4	6
00	0	0	0	0	0	2	4	8	0	2	2	2
Hr Total	3	1	0	0	0	6	12	15	16	13	13	15

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	3	4	7	4	2	2	5	1	0	1	0	3
30	2	4	5	1	3	9	5	4	0	1	1	0
45	7	9	5	7	6	9	5	0	0	2	0	0
00	2	3	4	7	2	2	3	2	2	0	1	0
Hr Total	14	20	21	19	13	22	18	7	2	4	2	3

24 Hour Total : 239  
 AM peak hour begins : 07:30 AM peak volume : 25 Peak hour factor : 0.52  
 PM peak hour begins : 17:15 PM peak volume : 25 Peak hour factor : 0.69

\*\*\*\*\*

Adams Traffic  
813-763-7763

Volume Report with 24 Hour Totals

\*\*\*\*\*

Data File : D1215003.PRN  
 Station : 000012140907  
 Identification : 000025620001 Interval : 15 minutes  
 Start date : Dec 15, 09 Start time : 00:00  
 Stop date : Dec 15, 09 Stop time : 24:00  
 City/Town : Inglis County : Levy  
 Location : CR 336 east of SR 121/US 19

\*\*\*\*\*

Dec 15 Total Volume for All Lanes

End Time	00	01	02	03	04	05	06	07	08	09	10	11
15	2	0	3	0	0	0	3	9	5	7	12	8
30	1	1	0	0	1	4	6	10	15	5	6	8
45	0	0	0	0	0	3	4	8	5	4	10	12
00	0	0	0	0	2	5	9	10	4	8	3	3
Hr Total	3	1	3	0	3	12	22	37	29	24	31	31

End Time	12	13	14	15	16	17	18	19	20	21	22	23
15	7	8	7	12	4	8	7	4	0	1	1	3
30	4	6	8	9	10	12	6	6	0	4	3	0
45	12	13	10	12	15	18	7	1	1	2	1	1
00	6	6	5	14	5	6	4	2	2	2	2	0
Hr Total	29	33	30	47	34	44	24	13	3	9	7	4

24 Hour Total : 473  
 AM peak hour begins : 07:30 AM peak volume : 38 Peak hour factor : 0.63  
 PM peak hour begins : 15:00 PM peak volume : 47 Peak hour factor : 0.84

\*\*\*\*\*

FDOT FLEXIBLE PAVEMENT DESIGN MANUAL

TABLE A.4A



TABLE A.4A

REQUIRED STRUCTURAL NUMBER (SN<sub>R</sub>)  
 90% RELIABILITY (%R)  
 RESILIENT MODULUS (M<sub>R</sub>) RANGE 4000 PSI TO 18000 PSI

		RESILIENT MODULUS (M <sub>R</sub> ), (PSI × 1000)																	
ESAL <sub>0</sub>		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
100	000	3.02	2.77	2.59	2.44	2.31	2.21	2.12	2.04	1.97	1.91	1.86	1.81	1.76	1.72	1.68			
150	000	3.23	2.97	2.77	2.61	2.47	2.36	2.27	2.19	2.11	2.05	1.99	1.94	1.89	1.84	1.80			
200	000	3.39	3.11	2.90	2.73	2.60	2.48	2.38	2.30	2.22	2.15	2.09	2.03	1.98	1.94	1.89			
250	000	3.52	3.23	3.01	2.84	2.69	2.57	2.47	2.38	2.30	2.23	2.17	2.11	2.06	2.01	1.97			
300	000	3.62	3.33	3.10	2.92	2.78	2.65	2.55	2.46	2.37	2.30	2.24	2.18	2.12	2.07	2.03			
350	000	3.71	3.41	3.18	3.00	2.85	2.72	2.61	2.52	2.44	2.36	2.30	2.23	2.18	2.13	2.08			
400	000	3.79	3.49	3.25	3.07	2.91	2.78	2.67	2.58	2.49	2.42	2.35	2.29	2.23	2.18	2.13			
450	000	3.87	3.56	3.32	3.13	2.97	2.84	2.73	2.63	2.54	2.46	2.39	2.33	2.27	2.22	2.17			
500	000	3.93	3.62	3.38	3.18	3.02	2.89	2.77	2.67	2.59	2.51	2.44	2.37	2.31	2.26	2.21			
600	000	4.05	3.73	3.48	3.28	3.12	2.98	2.86	2.76	2.67	2.58	2.51	2.45	2.39	2.33	2.28			
700	000	4.14	3.82	3.57	3.36	3.20	3.05	2.93	2.83	2.73	2.65	2.58	2.51	2.45	2.39	2.34			
800	000	4.23	3.90	3.64	3.44	3.27	3.12	3.00	2.89	2.80	2.71	2.63	2.57	2.50	2.44	2.39			
900	000	4.31	3.97	3.71	3.51	3.33	3.18	3.06	2.95	2.85	2.76	2.69	2.62	2.55	2.49	2.44			
1 000	000	4.38	4.04	3.78	3.57	3.39	3.24	3.11	3.00	2.90	2.81	2.73	2.66	2.60	2.54	2.48			
1 500	000	4.65	4.30	4.03	3.81	3.62	3.46	3.33	3.21	3.10	3.01	2.92	2.85	2.78	2.71	2.65			
2 000	000	4.85	4.50	4.21	3.99	3.79	3.63	3.49	3.36	3.25	3.16	3.07	2.99	2.91	2.85	2.78			
2 500	000	5.01	4.65	4.36	4.13	3.93	3.76	3.62	3.49	3.38	3.27	3.18	3.10	3.02	2.95	2.89			
3 000	000	5.14	4.77	4.48	4.25	4.05	3.88	3.73	3.60	3.48	3.37	3.28	3.19	3.12	3.04	2.98			
3 500	000	5.25	4.88	4.59	4.35	4.14	3.97	3.82	3.69	3.57	3.46	3.36	3.28	3.20	3.12	3.06			
4 000	000	5.35	4.98	4.68	4.44	4.23	4.06	3.90	3.77	3.65	3.54	3.44	3.35	3.27	3.19	3.12			
4 500	000	5.44	5.06	4.76	4.52	4.31	4.13	3.98	3.84	3.72	3.61	3.51	3.42	3.33	3.26	3.19			
5 000	000	5.52	5.14	4.83	4.59	4.38	4.20	4.04	3.90	3.78	3.67	3.57	3.47	3.39	3.31	3.24			
6 000	000	5.66	5.27	4.96	4.71	4.50	4.32	4.16	4.02	3.89	3.78	3.67	3.58	3.49	3.41	3.34			
7 000	000	5.78	5.38	5.07	4.82	4.61	4.42	4.26	4.12	3.99	3.87	3.77	3.67	3.58	3.50	3.43			
8 000	000	5.88	5.48	5.17	4.91	4.70	4.51	4.35	4.20	4.07	3.95	3.85	3.75	3.66	3.58	3.50			
9 000	000	5.97	5.57	5.26	5.00	4.78	4.59	4.43	4.28	4.15	4.03	3.92	3.82	3.73	3.65	3.57			
10 000	000	6.06	5.65	5.33	5.07	4.85	4.66	4.50	4.35	4.22	4.10	3.99	3.89	3.79	3.71	3.63			
15 000	000	6.39	5.97	5.64	5.37	5.14	4.95	4.77	4.62	4.48	4.36	4.25	4.14	4.05	3.96	3.88			
20 000	000	6.63	6.20	5.86	5.59	5.35	5.15	4.98	4.82	4.68	4.55	4.44	4.33	4.23	4.14	4.06			
25 000	000	6.82	6.38	6.04	5.76	5.52	5.32	5.14	4.98	4.84	4.71	4.59	4.48	4.38	4.29	4.20			
30 000	000	6.98	6.53	6.18	5.90	5.66	5.45	5.27	5.11	4.96	4.83	4.71	4.60	4.50	4.41	4.32			
35 000	000	7.12	6.66	6.31	6.02	5.78	5.57	5.38	5.22	5.07	4.94	4.82	4.71	4.61	4.51	4.42			
40 000	000	7.24	6.78	6.42	6.13	5.88	5.67	5.48	5.32	5.17	5.04	4.91	4.80	4.70	4.60	4.51			
45 000	000	7.34	6.88	6.52	6.22	5.97	5.76	5.57	5.41	5.26	5.12	5.00	4.88	4.78	4.68	4.59			
50 000	000	7.44	6.97	6.61	6.31	6.06	5.84	5.65	5.49	5.34	5.20	5.07	4.96	4.85	4.76	4.66			
60 000	000	7.61	7.13	6.76	6.46	6.21	5.99	5.79	5.62	5.47	5.33	5.21	5.09	4.98	4.88	4.79			
70 000	000	7.76	7.27	6.90	6.59	6.33	6.11	5.91	5.74	5.59	5.45	5.32	5.20	5.09	4.99	4.90			
80 000	000	7.88	7.40	7.01	6.70	6.44	6.22	6.02	5.85	5.69	5.55	5.42	5.30	5.19	5.09	4.99			
90 000	000	8.00	7.51	7.12	6.80	6.54	6.31	6.11	5.94	5.78	5.64	5.51	5.39	5.28	5.17	5.08			
100 000	000	8.10	7.60	7.21	6.90	6.63	6.40	6.20	6.02	5.86	5.72	5.59	5.47	5.35	5.25	5.15			

GEOTECHNICAL REPORT



## UNIVERSAL ENGINEERING SCIENCES

Consultants in: Geotechnical Engineering • Environmental Engineering  
Construction Materials Testing • Threshold Inspection • Private Provider Inspection

OFFICES IN  
• Clermont, FL  
• Daytona Beach, FL  
• DeBary, FL  
• Fort Myers, FL  
• Gainesville, FL  
• Hollywood, FL  
• Jacksonville, FL  
• Norcross, GA  
• Ocala, FL  
• Orlando, FL  
• Palm Coast, FL  
• Pensacola, FL  
• Rockledge, FL  
• Sarasota, FL  
• St. Augustine, FL  
• Tampa, FL  
• West Palm Beach, FL

May 26, 2010

Tarmac of America  
455 Fairway Drive  
Deerfield Beach, Florida 33441

Attention: Ms. Cindy Burns  
Project Engineer

Reference: **Limited Report of Pavement Evaluation Services**  
C.R. 336 from Levy-Marion County Line to S.R. 121  
Levy County, FL  
UES Project No. 0210.1000111.0000      UES Report No. 839419

Dear Ms. Burns:

Universal Engineering Sciences, Inc. has completed the limited pavement evaluation for the subject project in Levy County, Florida. This Report is submitted in satisfaction of the contracted scope of services. Our engineering services were performed in accordance with UES Proposal No. 836677 dated May 7, 2010. This Report briefly presents the limited data obtained, and provides our engineering evaluation of the existing roadway pavement sections.

### Objectives

As requested the objectives of this pavement evaluation study were to perform a limited subsurface exploration of the existing roadway to gather information concerning the existing pavement section as well as the near surface soil conditions at select location. To accomplish these objectives our exploration included:

- Site reconnaissance to observe existing site conditions such as pavement condition, vegetation, water levels, and adjacent structures.
- Evaluation of pavement cores at the requested three locations along the existing roadway.
- Engineering visual classification of recovered soil samples and performance of laboratory soil tests for sample classifications.
- Evaluation of the suitability of the existing subgrade soils for pavement support, based on the limited field and laboratory testing program.
- Developing an existing average pavement section based on the limited field and laboratory testing program.

Page No.: 2 of 4  
Project No: 0210.1000111.0000  
Report No: 839419  
Date: May 26, 2010

### **Site Location and Project Description**

We understand that Tarmac will be developing a large tract off County Road 336 in Levy County. As part of this development, approximately 9 miles of CR 336 needs to be evaluated to determine existing roadway pavement sections. CR 336 is an urban road located in the east section of Levy County and the existing pavement is asphaltic concrete.

The roadway consists of a two travel lanes with roadside stormwater drainage swales. It was requested that Universal Engineering Sciences perform three cores within the pavement area to provide an evaluation based on the conditions at the tested locations.

### **Field Exploration**

As requested, our field exploration consisted of performing three (3) pavement cores along the existing roadway. Shallow hand auger borings were also performed at each core location. Soil borings were performed to depths of 5 feet. The field testing activities were started and completed on May 16, 2010. The soil test boring locations are presented on the attached boring location plan. Existing pavement conditions were also evaluated by obtaining core samples of the asphalt pavement, and the subgrade.

Auger borings were advanced using hand auger techniques. Hand augers are performed by advancing a hand held sampler into the soil and inspecting the soil recovered. All boreholes were backfilled upon field work completion. Samples of the soils encountered will be held in our laboratory for your inspection for 90 days and then discarded, unless we are notified otherwise. The pavement core areas were backfilled with cold patch.

### **Laboratory Soil Testing**

#### **Visual Classification**

The soil samples recovered from the soil test borings were returned to our Gainesville soils laboratory where a Geotechnical Engineer visually examined them and reviewed the field descriptions in accordance with ASTM D-2488. We then selected representative soil samples for laboratory testing. Using the results of the laboratory soil tests, our visual examination, and review of field Boring Logs we classified the roadway borings in accordance with the current AASHTO Soil Classification System.

#### **Index Testing**

Laboratory testing was performed on selected samples of the soils encountered in the field exploration to better define soil composition and properties. Testing performed in accordance with ASTM procedures determined the percent fines (ASTM C-136) and natural moisture contents (ASTM D-2216). The test results have been presented on the attached Boring Logs.

**General Subsurface Conditions**

**General**

Stratification of the explored soils is based upon visual examination of the recovered soil samples, laboratory classification and index testing, and interpretation of the field boring logs by a geotechnical engineer. Stratification lines represent approximate boundaries between soil types; however, the actual transition between layers may be gradual. It should be noted that groundwater conditions may vary significantly between borings and overtime. The subsurface conditions found in the soil test borings have been summarized in the attached Boring Logs and described below. It should be understood that soil and groundwater conditions can vary between borings.

**Soil Profile**

Roadway borings taken through the existing pavement found from about 2.3 to 2.6 inches of asphaltic concrete course, overlying 8 inches of to 8.5 inches of crushed limerock base with asphalt. Below the limerock base the roadway auger borings generally found sand with silt [SP-SM] with lenses of silty sand to the depths explored. The groundwater level was measured at depths of 3 to 4.5 feet below existing pavement surface at the boring locations at the time of our exploration. Fluctuations of the groundwater levels should be expected to occur seasonally as a result of rainfall, surface runoff, and nearby construction activities.

The information presented in the appended Boring Logs, and related information included in this report, are indicators of subsurface conditions only at the specific test locations and times noted. Subsurface conditions, including groundwater levels and the presence of deleterious materials, at other locations on the site may differ significantly from conditions which, in the opinion of UES, exist at the actual sampling locations. It should be noted that the passage of time may affect conditions at the sampling locations.

**Pavement Section Coefficient Values**

UES engineering personnel performed a **limited** reconnaissance of the pavement conditions. Pavement Cores taken through the existing pavement encountered from about 2.3 to 2.6 inches of asphaltic concrete course, overlying base material. A summary of the pavement conditions at each core location is provided in Table 1 - Pavement Composition Data.

Table 1. Pavement Composition Data							
Core No.	Pavement Layer		Limerock Base w/asphalt		Stabilized subgrade		Pavement Condition
	Thick (inch)	Str. Coeff.	Thick (inch)	Str. Coeff.	Thick (inch)	Str. Coeff.	
C-1	2.3	0.34	8.5	0.18	12	0.08	Good
C-2	2.6	0.34	8.5	0.18	12	0.08	Good
C-3	2.3	0.34	8	0.18	12	0.08	Good

We used the Florida Department of Transportation (FDOT) values for pavement layer structural coefficients based on our estimates of the existing pavements condition. We estimated the current, in-place layer values for the asphalt course. Based on the asphalt, base thickness, and the current estimated pavement conditions, we estimated a Structural Numbers (SN) for the existing roadway pavement sections of **3.2 to 3.4**

Page No.: 4 of 4  
Project No: 0210.1000111.0000  
Report No: 839419  
Date: May 26, 2010

**Report Limitations**

This Report has been prepared for the exclusive use of Tarmac of America, and other members of the design/construction team for the specific project discussed in this Report. This Report has been prepared in accordance with generally accepted local geotechnical engineering practices; no other warranty is expressed or implied.

If any changes in the design, location or elevation of the proposed project elements as outlined in this Report are planned, or if any structures are included or added that are not discussed in the Report, the conclusions and recommendations contained in this Report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

Report reflects the pavement conditions at the time of exploration. If the recommendations presented in this Report are not implemented within a reasonable amount of time, significant changes in site conditions may occur and additional engineering reviews may become appropriate.

**Closure**

We have enjoyed being a part of the engineering team on this project, and appreciate the opportunity to have assisted Tarmac of America towards its successful completion. Please contact our office if you have any questions or need further assistance.

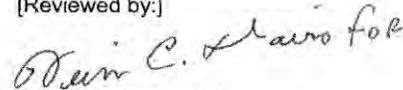
Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES, INC.  
Certificate of Authorization Number 549



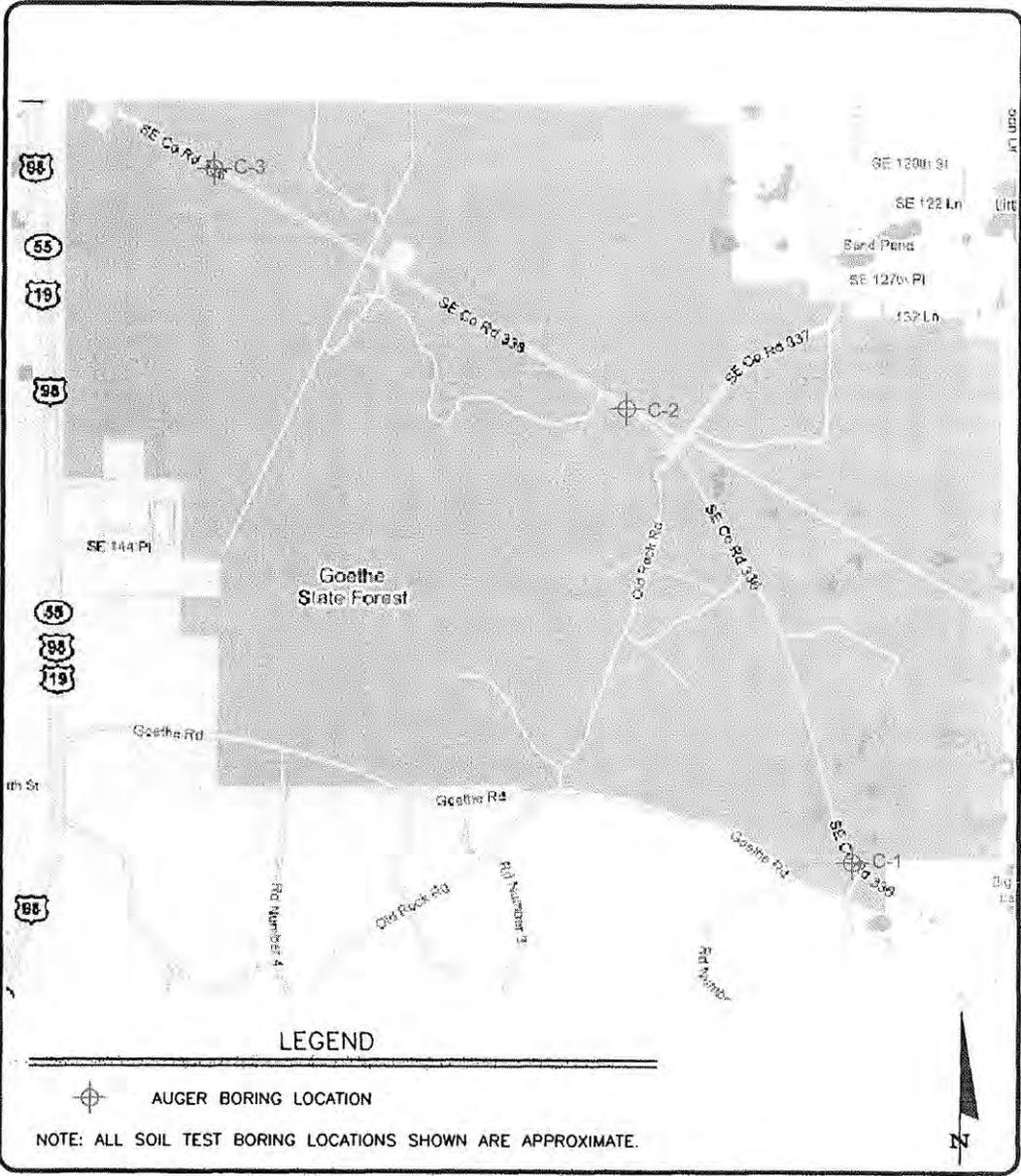
Eduardo Suarez, P.E.  
Project Engineer  
Florida P.E. No. 60272  
Date: 5-26-10

[Reviewed by:]



Jeffrey S. Pruett, P.E.  
Vice President  
Florida P.E. No. 50775

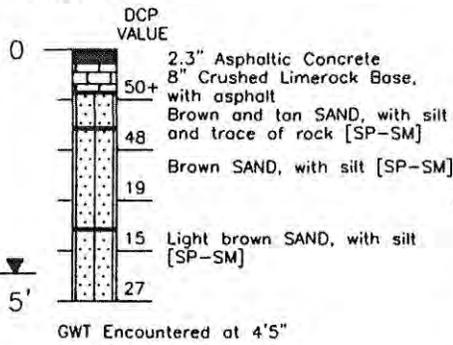
ES/JSP:es (2)  
Attachments: Boring Location Plan, Boring Logs, Key to Borings Logs



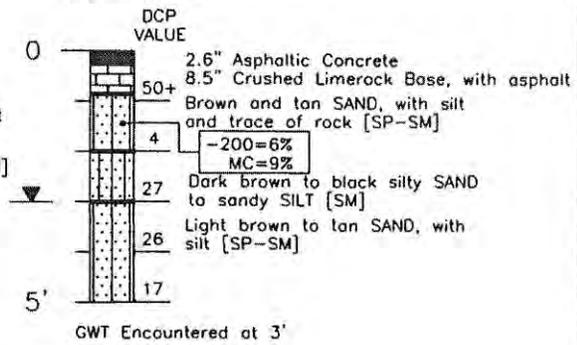
0210.0800111-A

 <b>UNIVERSAL</b> ENGINEERING SCIENCES	C.R. 336 FROM LEVY-MARION COUNTY LINE TO S.R. 121						
	LEVY COUNTY, FLORIDA						
	<b>CORE / BORING LOCATION PLAN</b>						
DRAWN BY:	KD	DATE:	05/18/10	CHECKED BY:	ES	DATE:	05/18/10
SCALE:	NTS	PROJECT NO:	0210.1000111.0000	REPORT NO:	839419	PAGE NO:	A - 1

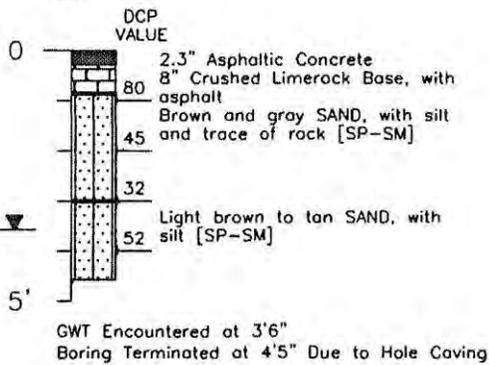
### C - 1



### C - 2



### C - 3



C.R. 336 FROM LEVY-MARION COUNTY LINE TO S.R. 121

LEVY COUNTY, FLORIDA

CORE / BORING LOGS

UNIVERSAL  
ENGINEERING SCIENCES

DRAWN BY: KD	DATE: 05/18/10	CHECKED BY: ES	DATE: 05/18/10
SCALE: NTS	PROJECT NO: 0210.1000111.0000	REPORT NO: 839419	PAGE NO: A - 2

0210.0800111-A



**KEY TO BORING LOGS**

**SYMBOLS**

22	Number of Blows of a 140-lb Weight Falling 30 in. Required to Drive Standard Spoon One Foot
WOR	Weight of Drill Rods
S	Thin-Wall Shelby Tube Undisturbed Sampler Used
90% Rec.	Percent Core Recovery from Rock Core-Drilling Operations
■	Sample Taken at this Level
□	Sample Not Taken at this Level
—	Change in Soil Strata
~	Free Ground Water Level
▽	Seasonal High Ground Water Level

**RELATIVE DENSITY**  
**(sand-silt)**

Very loose - Less Than 4 Blows/Ft.  
 Loose - 4 to 10 Blows/Ft.  
 Medium Dense - 10 to 30 Blows/Ft.  
 Dense - 30 to 50 Blows/Ft.  
 Very Dense - More Than 50 Blows/Ft.

**CONSISTANCY**  
**(clay)**

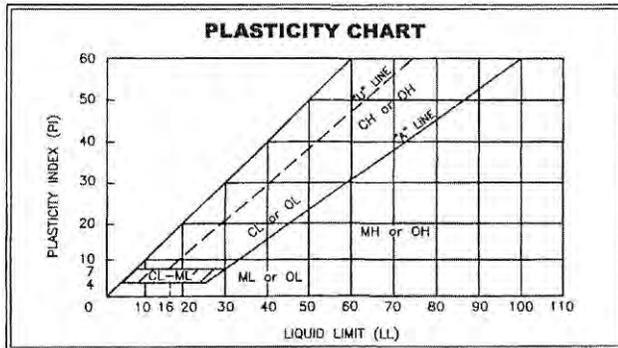
Very Soft - Less Than 2 Blows/Ft.  
 Soft - 2 to 4 Blows/Ft.  
 Firm - 4 to 8 Blows/Ft.  
 Stiff - 8 to 15 Blows/Ft.  
 Very Stiff - 15 to 30 Blows/Ft.  
 Hard - More Than 30 Blows/Ft.

Based on Safety Hammer N-Values

**UNIFIED CLASSIFICATION SYSTEM**

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 200 sieve	CLEAN GRAVELS	GW Well-graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GP Poorly graded gravels and gravel-sand mixtures, little or no fines
			GM Silty gravels, gravel-sand-silt mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW Well-graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SP Poorly graded sands and gravelly sands, little or no fines
			SM Silty sands, sand-silt mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH	Inorganic clays or high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
Highly organic Soils	PT	Peat, muck and other highly organic soils	

\* Based on the material passing the 3-in. (75mm) sieve.





**APPENDIX K  
SOUND IMPACT STUDY**





**Tarmac King Road Mine,  
Levy County, Florida  
Potential Sound Impact Study**

Tarmac America LLC  
455 Fairway Drive  
Deerfield Beach, FL 33441

**Prepared by:**

Grove Scientific & Engineering Company  
Mr. Dart Morales, principal scientist  
6140 Edgewater Drive, Suite F  
Orlando, Florida 32810

**GSE Project # 215900  
March 2010**

[www.grovescientific.com](http://www.grovescientific.com)



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**ENVIRONMENTAL PROFESSIONAL’S STATEMENT**

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312 and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. All data and conclusions contained in this report were prepared by me or agents under my direct supervision. They are true and correct to the best of my knowledge.

---

Grove Scientific and Engineering Company  
Dart Morales, Senior Scientist

---

Date

## **SECTION ONE INTRODUCTION**

### **1.1 Introduction**

The *Land Development Code* of Levy County provides that mining projects shall address the impacts of blasting activities (if applicable), vibration, noise and sound generated from the project site and transmitted to the surrounding area. Tarmac America, LLC (Tarmac) has contracted with Grove Scientific and Engineering Company (GSE) to study the anticipated sound impacts from the proposed opencast limestone mine located on King Road in Levy County. The focus of this study is to evaluate long-term environmental ambient noise impacts from the mining activity. Ground vibration or sound impacts from blasting operations are not the subject of this study.

The *CODE OF ORDINANCES of LEVY COUNTY, FLORIDA Codified through Ordinance No. 2009-03, enacted Sept. 22, 2009.(Supplement No. 12) ARTICLE VIII., DIVISION 2., Sec. 50-351 (7)* specifically exempts from the published sound level limits of the Code the following activities: *“farming, forestry, and mining operations, and incidental activities including but not limited to sounds created by equipment, domestic livestock and production and marketing activities in agriculture and forestry/rural residential zoning districts.”*

Tarmac intends to engage in mining operations at the Tarmac King Road Limestone Mine property which is zoned forestry/rural residential and, as such, is exempt from the published sound level limits of the Code. While exempt from the sound limits of the code, Tarmac desires to be a good neighbor in the community and has initiated this study to determine the expected noise levels of its operations.

### **1.2 Purpose of the Study**

The purpose of this study is to develop preconstruction estimates of potential sound emanation levels from a proposed opencast limestone mine. Opencast mining refers to a method of extracting rock or minerals from the earth using an open pit or borrow. This method differs from mining by extractive methods that require tunneling into the earth. Open-pit mines are used when deposits of commercially useful minerals or rock are found near the surface where the overburden (surface material covering the desired deposit) is relatively thin.

### **1.3    Principal Investigator**

Mr. Dart Morales, Senior Scientist with Grove Scientific and Engineering Company was the principal investigator for this study. Mr. Morales earned a Bachelor of Science in Biological Science from Florida Institute of Technology in 1979. Since 1981, he has specialized in the field of environmental science and engineering. His specialty is the measurement of multi-media parameters and the subsequent data interpretation with respect to environmental regulations. He has approximately 20 years experience measuring community, personnel, and industrial machinery sound levels. Mr. Morales has been qualified in a judicial proceeding as an expert witness in sound studies.

Mr. Morales is certified by the Florida Department of Transportation and Orange County, Florida to conduct noise impact studies. Sample projects include predictive impact studies for the WCPX Channel Six Helipad, several concrete plants, mines and landfills. Mr. Morales authored Brevard County's original numeric standard-based Noise Ordinance.

**SECTION TWO**  
**SITE DESCRIPTION**

**2.1 Existing Site Conditions**

The present site is primarily undeveloped forest improved by roads. It is centered at approximately at 29 degrees 05 minutes north latitude and 82 degrees 40 minutes west longitude and encompasses all, or portions of, Sections 8, 9, 10, 11, 14, 15, 16, 17, 22 and 23 of Township 16 South, Range 16 East. An aerial view is provided in Figure 1.

**Figure 1**  
**Aerial View of the Tarmac King Road Property**



**2.1.1 Surrounding Character of the Area**

Traditional land uses for the site and the surrounding parcels are forestry, silviculture, agriculture, ranching, and borrow pits (limestone mining). The surrounding parcels are

developed similarly. There are a few small home sites and hunting camps near the site, mostly to the south and east. Further south and east are the communities of Yankeetown, Crackertown and Inglis.

### **2.1.2 Residential Structures**

There are no residential structures within the project boundary. A small number of farms, home sites and hunting camps are located on parcels to the east and south of the property. There are no permanent residential developments on parcels located immediately north or west of the property. The closest incorporated communities are Inglis and Yankeetown, approximately three miles south of the property.

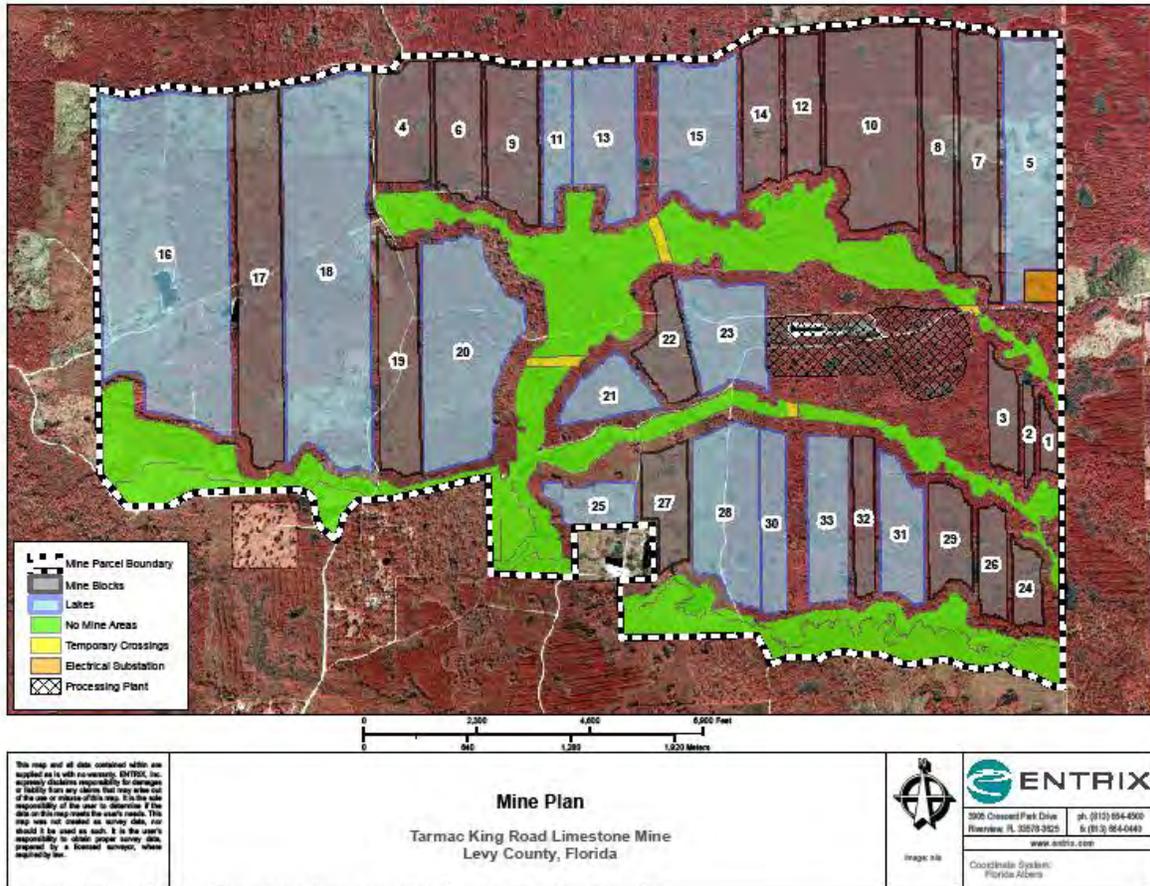
### **2.1.3 Environmental, Cultural and Historical Resources**

No identified cultural or historical resources were found on or adjacent to the mine property. The Waccasassa Bay State Preserve lies immediately west of the project's proposed mitigation area, and the Goethe National Forest lies approximately two miles northeast of the site. Both are situated well beyond any potential sound impacts from mining equipment. If the project receives all required permits and land use approvals, Tarmac will donate approximately 4,500 acres of land adjacent to the Waccasassa Bay State Preserve to the state of Florida.

## **2.2 Projected Site Conditions**

The proposed use is limestone mining. A central processing plant will crush, wash, and grade limestone for commercial sale. The initial two years of operations will focus primarily on construction and infrastructure development including some limited mining to produce crushed rock for infrastructure needs on site. Normal mining production operations are expected to begin approximately two years after receipt of all required permits. The proposed mine plan along with the proposed location of the central processing plant is provided in Figure 2.

**Figure 2**  
**Tarmac King Road Mine Plan and Plant Location**



**2.3 Current Sound Field at Site**

The current sound field surrounding the mine (the adjacent properties) includes sound impacts emanating primarily from roads, silviculture and agriculture. Several roads, both paved and unpaved, offer access to the home sites, forests, and businesses around the parcel. U.S. Highway 19/98 is located approximately 1.2 miles to the east. Sound from diesel equipment associated with earth moving occasionally emanates from nearby borrow pits. Silviculture operations are conducted both on the project site and on surrounding parcels. Sounds associated with timber harvesting include chainsaws and heavy diesel equipment (cutting and loading equipment and trucks). The site is within the Gulf Hammock Wildlife Management Area and there are several seasons devoted to gun hunting and gun hunting with dogs. Wild hog hunting is open year-round, and therefore firearms discharges are common.

## **2.4 Anticipated Mine Sound Sources**

The primary sound generators within a mine are the vehicles and machines that operate within it. Mobile or portable equipment such as dump trucks, water trucks, loaders, dozers and pumps are primarily diesel powered. Stationary and semi-stationary equipment such as conveyors, draglines, crushers, and screening plants are typically electrically powered.

Another sound feature of mining operations is blasting. As previously stated, blasting will be specifically addressed in a separate report from Tarmac's seismology consultants. Blasting is an intermittent activity used to fracture rock so that the dragline is able to excavate the material.

The King Road Mine will have a central processing plant where the final crushing, screening and stockpiling of the limestone will occur.

### **2.4.1 Diesel powered Sources**

Table 1 contains a list of various types of diesel-powered equipment commonly found in mines along with their estimated sound levels. This equipment is highly mobile. Tarmac plans to use similar equipment in its proposed operations, except that Tarmac will load material directly into a crusher hopper. Dump trucks will not be used in its mining operations. Excavators, dozers and loaders will be used to remove overburden, build and maintain mine infrastructure, and load material from stockpiles onto conveyors. The sources for these estimates are other studies, manufacturer's specifications and actual field measurements. Although they are not definitive sound level values, GSE has, after years of field experience, found them to remarkably accurate for predicting actual noise emissions from the equipment deployed in the field.

**Table 1**  
**Typical Average Sound Emission Levels for Diesel Powered Equipment**

Equipment Type	Estimated Sound Level (dBA) at 50'	Estimated Sound Level (dBA) at 100'	Estimated Sound Level (dBA) at 200'	Estimated Sound Level (dBA) at 400'
Primary Crusher Plant (diesel)	82	76	70	64
CAT 300 Excavator	78	72	66	60
CAT 980F Loader	73	67	61	55
CAT 14 Motor Grader	81	75	69	63
10 wheel Dump Truck	74	68	62	56
4,000 gallon Water Truck	70	64	58	52
Dewatering Pump (diesel)	80	74	68	62

**2.4.2 Electrically powered Sources**

Table 2 lists sound levels for the electrically powered equipment typically found in limestone mines. This group of equipment tends to be semi-mobile or stationary. Typical equipment in this category includes walking draglines, conveyor systems, and crushing and screening plants. All of these machines will be used at the Tarmac King Road Mine.

**Table 2**  
**Typical Average Sound Emission Levels for Electric Powered Equipment**

Equipment Type	Estimated Sound Level (dBA) at 50'	Estimated Sound Level (dBA) at 100'	Estimated Sound Level (dBA) at 200'	Estimated Sound Level (dBA) at 400'
Dragline	80	75	69	63
Primary crusher (empty)	68	62	56	50
Primary crusher (crushing)	78	75	70	64
Screening plant	80	72	66	60

## SECTION THREE

### ESTIMATED SOUND LEVELS FROM THE PROPOSED MINE

#### **3.1 Technical Approach**

Because at this time there is no mine activity at the site, the study utilized published data from private and government publications, empirical data collected by GSE for other sound impact projects, and manufacturers' information for equipment proposed for use at the mine. Sound follows a predictable decay rate when propagated in a free field, therefore, with an initial value and distance, accurate predictions of anticipated sound levels from that activity at other distances can be made.

*Article VIII, Division 2, Sec. 50-351. Exemptions for the sound level limits of the Levy County Land Development Code lists the following specific exemptions from the sound level limits of the ordinance: “(7) Farming, forestry and mining operations and incidental activities including but not limited to sounds created by equipment, domestic livestock and production and marketing activities in agriculture and forestry/rural residential zoning districts. (8) Sounds emanating from activities permitted by right on properties designated agricultural/rural residential and forestry/rural residential.”*

Because Tarmac intends to engage in mining operations at the Tarmac King Road Mine property, and because it is zoned forestry/rural residential, it is included within the listed exemption. However, Tarmac is committed to being a good neighbor and has enlisted the services of GSE to determine if landowners adjacent to the property may be subject to sound impacts that they may perceive as a nuisance.

#### **3.2 Sound Level Prediction Methodology (Inverse Square Rule)**

A simple mathematic function demonstrates that the sound energy of a sound source propagating in a free field (no obstructions or reflections) can be estimated for any distance if we know its initial sound energy. This is accomplished by subtracting six decibels for each doubling of a distance. This is known as the “inverse square” rule and it is the basis for all sound emanation decay analysis. While the modeling can become quite complex in a reflecting environment, in an open, rural, unpaved field, it works well. In fact, it tends to under estimate decay rates (over estimate predicted levels) because there is no adjustment for insertion loss due to grass, vegetation, ground surface irregularity, or loose soil. The inverse square rule is explained in Appendix B.

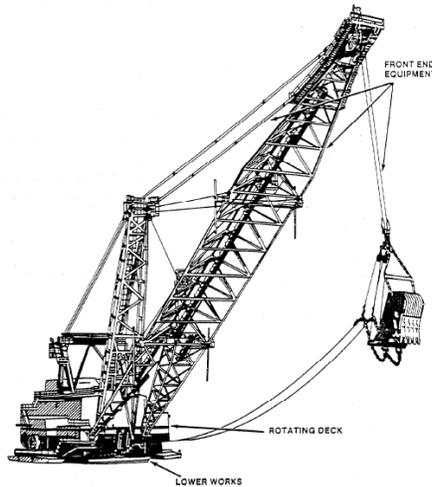
For sound data collected directly by GSE (Pennsocco Mine, Medley, Florida) sound level measurements were collected with a Metrosonics dB 308 dosimeter (serial no: 2914). Calibration checks were performed before and after testing, utilizing a Metrosonics model CL304 ANSI S1-40-1984 complaint, 102 decibel calibrator (serial no: 3176). The calibration checks indicated the meter was within specification. The recorded data were downloaded and charted with the Metrosoft MS312 software developed for the dB308.

The meter was mounted on a camera tripod in order to elevate the microphone to a height of five feet above ground level. The microphone is of omnidirectional design fitted with an open cell foam wind muff. The meter was programmed to collect sound levels in decibels with an A-weighted filter network (dBA) set to slow response, no cut offs, and at a 3 dBA exchange rate. The meter was programmed to average data at ten (10) second intervals. A minimum of ten intervals were collected to determine average sound levels. If there was an identifiable repetitive cycle, a minimum of two full cycles were included. All test events were of sufficient duration to accurately represent the sound field of interest.

### **3.3 Brief Description of Opencast Mining Methodology**

Limestone mining begins by removing overburden from the underlying limestone. In the case of the King Road Mine, the water table is very close to the surface. The mine is too large and too deep for dewatering to be environmentally or economically feasible. As a result excavation will occur below the water table without dewatering. Underwater mining below a depth of approximately fifteen feet is best accomplished using a dragline (see Figure 3), which is a crane that drags a large bucket across the bottom of the excavation, hauls the gathered material to the surface, and drops it on a stockpile. Modern, large capacity draglines are electrically powered. As the mining progresses, the self-propelled dragline can move itself at a rate of approximately 10 feet per minute.

**Figure 3**  
**Typical Walking Electric Dragline**



The Tarmac King Road Mine will use a mobile, electric, primary impact crusher. The primary impact crusher is a track mounted unit that will follow the dragline and allows for primary crushing at the excavation site. Crushing the raw limestone at the excavation site allows it to be transported to the screening plant via conveyor belt. This method also eliminates the need for numerous excavation stockpiles which must typically be transported to a central primary crusher by a fleet of heavy duty diesel dump trucks. From the central primary crusher the material is then transported by conveyor belt to the processing plant. With a mobile, electric, primary impact crusher, such as the one to be used at the King Road Mine, only two front end loaders are needed to load the raw stockpile into the crusher and conveyor. This method reduces dust, noise, and fuel consumption substantially.

After excavation and primary crushing, the limestone is placed on a conveyor belt and transported to a centrally-located secondary processing plant (“screening plant”) where the rock is further crushed, washed, sorted, and deposited onto segregated stockpiles of construction grade aggregate. At this point, the material is suitable for commercial sale.

### **3.4 Estimate of Uncontrolled Sound Level Range At The Nearest Sensitive Receptor**

Using the predictive values of Table 2 and recent (2008) aerial photography, GSE identified areas where, in the absence of any noise mitigation, sound levels above 65 dBA average might potentially occur. The 65dBA reference point was chosen as this represents the daytime limit for sound impacts to residences as published in *Article VIII, Division 2, Sec. 50-349. Noise regulations in general., Table 1* of the Levy County Land Development Code.

Table 2 suggests that draglines, crushers, and screening plants have the most potential to exceed 65dBA emanation when a potential receptor is less than 400 feet away. GSE identified the nearest potential receptors to be a handful of home sites along the southwest boundary of the King Road Property as shown in Figure 4. In this area, the closest potential home site is approximately 515 feet away from potential mining areas and over 4,500 feet away from the aggregate plant. Mining is not planned in this area for at least 40 years.

Other mining areas are closer to the property line but only the area shown on Figure 4 is within 1,000 feet of existing home sites. This depicts the area where there is the potential for temporary exposure of a home site to an average level of 65dBA or more during operational hours. This impact estimate is based upon no mitigation controls for sound.

Tarmac will leave a 200 foot wide vegetated buffer in this area to mitigate sound levels. They will also build berms to a minimum elevation of 19 feet above sea level around all mining areas before excavation begins. This will help minimize any sound emanating from the mining areas.

**Figure 4**  
**Mining Area Closest to Existing Homes**



## **SECTION FOUR CONCLUSIONS**

GSE's analysis indicates there will be no noise emanating from permanent mine structures or operations which will impact receptors beyond Tarmac's property line at levels above the County noise ordinance's daytime limit for residential, agricultural and commercial zoning. No permanent industrial structure will be located closer than 3,500 feet from a residential property line. There will be no part of the aggregate processing plant which will be located less than 1700 feet from the Tarmac property line.

At some point during the life of the mine, short segments (a few hundred feet) of the King Road Mine property line may be at or slightly over 65 dBA during dragline operating hours. However, only a small portion of the mining area along Tarmac's southwestern property boundary is closer than 1,000 feet to any home site. The initial mining areas south of King Road and east of the aggregate processing plant are located approximately 3,500 feet from the nearest home sites - nearly nine times farther than the 400 foot distance at which noise from a dragline typically falls below the 65 dBA limit. Moreover, as discussed in Section 3.4, Tarmac will implement certain mitigation controls for sound that will further reduce potential noise impacts on adjacent areas.

The conclusion of this study is that this project's sound emanations:

- a) Will not be harmful or injurious to human health or welfare;
- b) Will not unreasonably interfere with the comfortable use and enjoyment of life or property;
- c) Will not adversely impact public historic, scenic, or recreational sites;
- d) Will not adversely impact wildlife or sensitive environmental land; and
- e) Will not create a public nuisance.

## **Appendix A**

### Levy County Sound Ordinance

**Sec. 50-349. Noise regulations in general**

It shall be unlawful for any person to create, operate, or cause to be operated on private property any source of sound in such a manner as to create a sound level which exceeds the limits set forth in table 1 for the category of property receiving the sound when measured at or within the boundary of property receiving the sound.

TABLE 1

Maximum Sound Levels for Receiving Land Uses at the Real Property Line  
(Unless Otherwise Specified).

TABLE INSET:

Category	Times	Sound Levels (dBA)
Residential districts excluding RR and other residential areas	7:00 a.m. to 10:00 p.m.	65
	10:00 p.m. to 7:00 a.m.	55
Rural agricultural districts (A/RR, F/RR and RR) for sound levels measured at the residence and areas designated NR	7:00 a.m. to 10:00 p.m.	65
	10:00 p.m. to 7:00 a.m.	55
Commercial districts (C-1, C-2)	7:00 a.m. to 10:00 p.m.	65
	10:00 p.m. to 7:00 a.m.	60
Industrial districts and commercial districts (C-3, C-4)	Anytime	75

(Ord. No. 99-5, § 80-5, 11-16-1999; Ord. No. 2007-07, § 3, 11-20-2007)

**Sec. 50-353. Noise control measurement standard**

(a) The measurement of sound shall be made with a sound level meter meeting the standards prescribed by ANSI S1.4-1971 or successor publications. The instruments shall be maintained in calibration and good working order. A calibration check shall be made of the system at the time of any sound level measurement. Measurements recorded shall be taken so as to provide a proper representation of the source of sound. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured sound. A windscreen for the microphone shall be used at all times.

(b) The slow meter response of the sound level meter shall be used in order to best determine the average amplitude. A measurement period shall not be less than 15 minutes, must be continuous, and must be taken at the time when normal operation of any loud noise source is occurring. In addition, sound levels that exceed the sound levels set forth in table 1 for more than two cumulative minutes out of any continuous 60-minute period shall be a violation.

(c) The measurement shall be made at any point on the property, unless specified in section 50-349, table 1, into which the sound is being transmitted and shall be made at least five feet above the ground or surface away from any obstructing or reflecting surface.

(d) All measurements of sound provided for in this division will be made by qualified officials of the county who are designated by the county administrator or sheriff designee to operate the apparatus used to make the measurements.

(e) The operator conducting noise measurement tests shall document all noise measurement results in a written record. Such record shall include the following:

- (1) The instrumentation used, including name, make, type, and serial number.
- (2) Date of last laboratory calibration.
- (3) On-site calibration verification before and after each series of measurements.
- (4) Name and location of the measuring area.
- (5) A detailed sketch of the measuring area.
- (6) Time and date of the measurements.
- (7) Name of the observers.
- (8) General weather conditions.

## **Appendix B**

### Inverse Square Rule

## SPREADING LAW

Point sources of sound produce equal sound radiation in all directions. The sound pressure level in a free field (no nearby significant reflecting surfaces) decreases by 6 dB each time the distance from a point source is doubled (Equation 2.3). This effect is sometimes referred to as the inverse square spreading law.

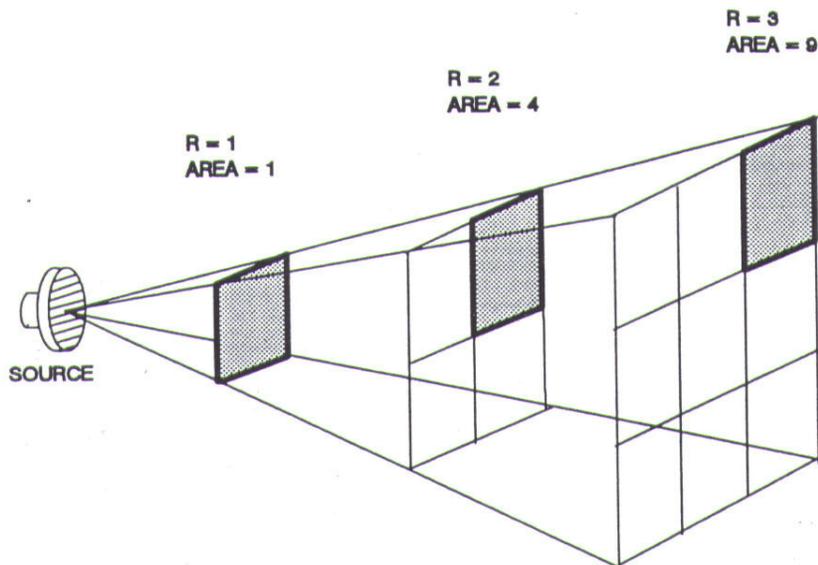
$$dB_1 - dB_2 = 20 \text{ Log}_{10}(r_1/r_2) \quad (2.3)$$

where:

- $dB_1$  = sound pressure level at distance  $r_1$  (dB)
- $dB_2$  = sound pressure level at distance  $r_2$  (dB)
- $r_1$  = first distance from point source, ft
- $r_2$  = second distance from point source, ft

As an example, if we are 10 ft away from the geometric center of a point source that measured 80 dB in a free field and we move to 20 ft away, the sound will be 6 dB less or 74 dB. Similarly, if we move double the distance again to 40 ft away, then the level will be 68 dB.

Figure 2.3 shows that the area over which the sound wave is spread varies by the area of the sphere and is proportional to the radius squared.



**APPENDIX L  
BLASTING STUDY**



# **Blasting Evaluation**

King Road Exploratory Pit  
Titan America, Inc.

April 5, 2010

## **EXECUTIVE SUMMARY**

This report is provided to address potential off-site impacts from the use of commercial explosives for the King Road Mine planned by Titan America, Inc. within Levy County. All of the analysis is provided to determine the operation's compliance to the regulatory limits and to ensure off site impacts will not be adversely created.

Commercial explosives use is controlled by the State Fire Marshal's Office, Department of Financial Services, State of Florida. This operation will fall under the Construction Materials Mining Activity regulations and will require a State permit prior to operations. This will require a review of the site, inspection and finally permitting.

The use of explosives at the site is required in order to fragment the rock which cannot be excavated by mechanical means alone. As such, drilling to a predetermined depth with a specific developed pattern will occur. Blasthole loading is completed by an independent licensed firm. State regulations require independent seismograph monitoring be completed to insure compliance to the State limits and insure no potential for off property defects is created.

The King Road Mine is located in southwestern Levy County. Blasting vibration and air overpressure (airblast) will be limited. With this operation, production blasting will be limited to 1-2 times per week. The off-property structures are 2,800 to over 13,000 feet from the site and would receive limited, if any, ground vibration and airblast. Levels expected from blasting within the initial key cut at the closest location are equivalent to 24% of the State limitation and within the range of normal human activity within homes and commercial buildings.

Testing completed as part of the King Road Exploratory Pit provided definitive vibration measurements that show limited off site vibration levels will be produced. They levels remain within the State of Florida limitations for Construction Materials Mining Activities and would have no potential for the creation of defects in adjacent structures.

**King Road Exploratory Pit  
Titan America, Inc.**

**PURPOSE**

This report is a summary and evaluation of blasting operations conducted during March and April 2006 in the Exploratory Excavation pit located on the Plum Creek Timberland property adjacent to King Road. The exploratory pit was authorized by Levy County to allow Titan America, Inc. to determine whether sufficient limestone materials were available to support a “major” mining operation as defined within the Levy County code. As part of the permitted activity, blasting operations were authorized. This report discusses the specifics of the blasting operations and the impact that would occur on the adjacent community from a major mining operation.

**PROCEDURE**

The Exploratory Pit set up for testing was located at the northwest corner of the intersection of King Road and Stealing Road. The exploratory pit was cleared of vegetation from the access road west approximately 1,000 feet. The initial test blasting was conducted starting at the west end of the cleared area. Subsequent blasts (three) were detonated from west to east in sequential order. In order to permit excavation by dragline equipment, the initial blast was oriented in a north to south line. The remaining blasts were detonated east to west extending approximately 200 feet in length with each blast.

In order to assess ground vibration at off property locations and structures and evaluate the community awareness of the blasting operations, vibration projections are necessary. To develop ground vibration projections statistical evaluation is necessary. Regression analysis was completed to develop the relationships of vibration reduction with distance. The data necessary for these relationships was developed using multiple seismographs located at specific distances. The vibration levels, distance and explosives charge weight per delay were combined to make the projection formulas and evaluation.

Ten blasting seismographs were used for the measurements conducted by GeoSonics, Inc. To develop a relationship for vibration projection a series of instruments were laid out extending from immediately adjacent to the blast site to the east of the blast site in an approximate straight line. The instruments were coupled to the ground and were installed at preset distances to obtain the required data. In addition to the instruments installed to the east, specific seismographs were located to the southwest near the Deerhaven Campsites. The remaining instruments were set up at individual points south of the blast site to evaluate levels at farther distances and insure that ground vibration levels were not perceptible, nor capable of creating annoyance.

## THE BLASTS

The blasts recorded for this study were detonated on March 14, 23 and April 6, 20, 2006. The blasts were located north of King Road west of the intersection with Stealing Road. Pertinent data on the loading firing of the blasts is tabulated in the following table.

### Blast Data

Blast No.	1	2	3	4
Date	3/14/06	3/23/06	4/6/06	4/20/06
Time	10:38 a.m.	11:08 a.m.	11:52 a.m.	11:50 a.m.
No. Holes	30	54	54	55
Hole Diameter (in.)	4.5	4.5	4.5	4.5
Hole Depth (ft.)	70	70	70	70
Burden and Spacing (ft)	12 x 14	12 x 14	12 x 14	12 x 14
Dyno C-35 ¾ lb. Cast Booster	45.00	81.00	81.00	82.50
Titan 1000 G Emulsion	15,390.00	27,702.00	27,702.00	28,215.00
<b>Total Explosives (lbs.)</b>	15,435.00	28,512.00	28,512.00	28,297.50
Method of Initiation	Dyno Nobel Single Electric Blasting Cap to Initiate			
Manufacturer/type	Dyno Nobel Nonel Non-electric Detonators			
Surface Delays	17, 25, 42 ms	17, 25, 42 ms	17, 25, 42 ms	17, 25, 42 ms
Downhole Delays	350 ms	350 ms	350 ms	350 ms
Maximum No. Holes per Delay	1	1	1	1
Maximum No. Pounds per Delay	514.75	513.00	513.00	513.00
Stemming (ft.)	10	10	10	10

The blasts were loaded and fired under the supervision of Mr. Ronald C. Sharp of Dyno Nobel, Inc. Mr. Sharp provided the information related to loading and detonation of the individual blasts.

## RECORDING LOCATIONS

The vibrations produced by the blasts were recorded with multiple **SAFEGUARD SEISMIC UNIT 3000** Series Seismographs. The recording locations are as follows:

1. The seismograph was located on the south side of Stealing Road, north of the exploratory pit. Approximately 500 feet northeast of the northeast corner of the initial blast within the proposed pit.

2. The seismograph was located on the south side of Stealing Road, north of the exploratory pit, approximately 1,500 feet northeast of the northeast corner of the of the initial blast within the proposed pit.
3. The seismograph was located on the south side of King Road, approximately 3,000 feet east of the southeast corner of the initial blast within the proposed pit.
4. The seismograph was located on the south side of King Road, approximately 1.1 miles east of the southeast corner of the initial blast within the proposed pit.
5. The seismograph was located at the southeast corner of the intersection of King Road and 72<sup>nd</sup> Court, Inglis, Florida.
6. The seismograph was located on the east side of 72<sup>nd</sup> Court, Inglis, FL, adjacent to the south property line of the Levaughn Robinson property.
7. The seismograph was located the northeast corner of the intersection of King Road and Butler Road, Inglis, FL.
8. The seismograph was located along the east side of the cleared property, approximately 100 feet south of County Road 40A, adjacent to St. Anthony's Catholic Church.
9. The seismograph was located at the northeast corner of the intersection of County Road 40 and County Road 40A, Yankeetown, Florida.
10. The seismograph was located at the northeast corner of the garage / storage building of the Levaughn Robinson's residence.

Mr. Jeffrey A. Straw, Vice President and Area Manager of GeoSonics, Inc. supervised and established recording procedures. Ms. Sarah K. Daniel, Technical Representative of GeoSonics, Inc. conducted recording procedures. During the recording procedures, instrument set up and some recording procedures were observed by Mrs. Levaughn Robinson.

## THE SEISMOGRAPHS

The **SAFEGUARD SEISMIC UNIT 3000** series blasting seismographs used during this evaluation are self-contained portable seismographs developed by GeoSonics, Inc., specifically for use in measuring the side effects from activities, such as those produced by blasting, pile driving, and vibratory compaction. The units are designed for field use in the mining, quarrying, and construction industries. The seismograph digitally samples three ground motion channels and one air overpressure channel at a rate (over 1,000 samples per second) high enough to permit accurate measurements.

The **SSU 3000 series** seismographs are capable of acting as a single-event recorder or as a continuous ground vibration and air overpressure monitor. In this study, the units were operated as single-event recording instruments.

Immediately following the event the instrument produces a waveform seismogram. In addition, the instrument records all information preprogrammed, including date, time, location; operator's name and company, triggering levels for vibration and air overpressure (airblast), and recording time. Analysis by the unit provides the maximum peak particle velocity in each of three mutually perpendicular components (Longitudinal, Transverse, and Vertical), as well as the associated one-half wave frequency and resultant peak particle velocity. The maximum peak air overpressure is measured and reported in pounds per square inch and decibels (dB). The response of the seismic and air channels is flat (less than 3 dB) over the entire frequency range of the unit.

A user specified option for each recording is the comparison of measured peak particle velocity and frequency to the United States Bureau of Mines/Office of Surface Mining and Reclamation blasting level criteria. This function allows immediate examination of vibration to damage probability criteria in order to evaluate the effects of the blast.

The individual seismographic records obtained during this study are enclosed following the conclusion of this report.

## RESULTS

Consideration of ground vibration and air overpressure (airblast) levels, and their potential for damage has been evaluated and documented in numerous studies. These studies have provided some fundamental considerations in evaluating the potential for damage. Publications by the United States Bureau of Mines, Department of the Interior, and other agencies indicate that the occurrence of damage is not related to the amount of movement to which a building is subjected (this is called "particle displacement"), but is related instead to the speed at which a structure is vibrated. The latter quantity is called "particle velocity". This measurement method, when coupled with the frequency of the seismic wave, is the best single method for the evaluation of potential damage. Measurements considered during this investigation were made in terms of particle velocity.

### Vibration Measurements

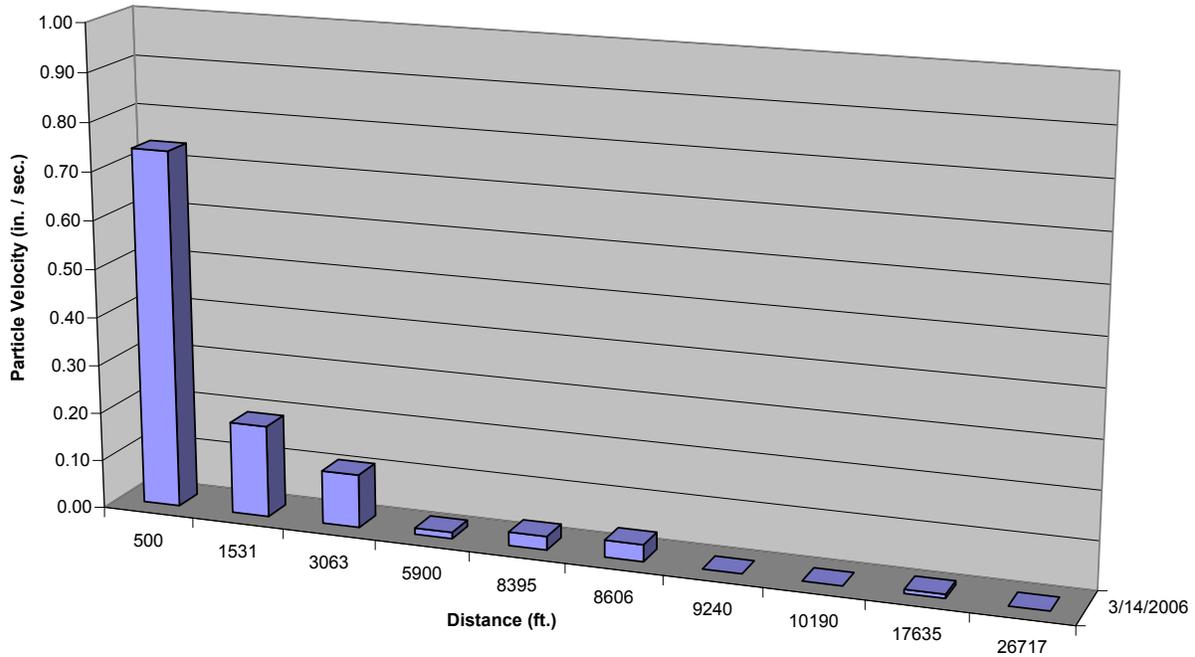
Date	Time	Distance (ft.)	Longitudinal (in. /sec.)	Transverse (in. /sec.)	Vertical (in. /sec.)	Percent of State Limit	Airblast dB / psi	Recording Location
3/14/06	10:38 a.m.	500	0.740 in. /sec. @ 14.3 Hz	0.503 in. /sec. @ 16.1 Hz	0.675 in. /sec. @ 41.7 Hz	98.6 % of 0.75 in./sec.	127 dB 0.0065 psi	Location 1
3/14/06	10:38 a.m.	1,531	0.150 in. /sec. @ 15.6 Hz	0.173 in. /sec. @ 22.7 Hz	0.190 in. /sec. @ 38.5 Hz	10 % of 1.90 in./sec.	118 dB 0.0025 psi	Location 2
3/14/06	10:38 a.m.	3,063	0.110 in. /sec. @ 15.6 Hz	0.063 in. /sec. @ 13.9 Hz	0.048 in. /sec. @ 22.7 Hz	15.7 % of 0.75 in./sec.	111 dB 0.0011 psi	Location 3
3/14/06	10:38 a.m.	5,900	<0.020 in./sec.	<0.020 in./sec.	<0.020 in./sec.	N/A	---	Location 4

Date	Time	Distance (ft.)	Longitudinal (in. /sec.)	Transverse (in. /sec.)	Vertical (in. /sec.)	Percent of State Limit	Airblast dB / psi	Recording Location
3/14/06	10:38 a.m.	8,395	0.023 in. /sec. @ 16.7 Hz	0.028 in. /sec. @ 16.7 Hz	0.010 in. /sec. @ 33.3 Hz	3.5 % of 0.80 in./sec.	102 dB 0.0004 psi	Location 5
3/14/06	10:38 a.m.	8,606	0.035 in. /sec. @ 16.7 Hz.	0.020 in. /sec. @ 16.7 Hz	0.010 in. /sec. @ 27.8 Hz	4.4 % of 0.80 in./sec.	101 dB 0.0003 psi	Location 6
3/14/06	10:38 a.m.	9,240	<0.020 in./sec.	<0.020 in./sec.	<0.020 in./sec.	N/A	---	Location 7
3/14/06	10:38 a.m.	17,635	0.008 in. /sec. @ 13.9 Hz.	0.005 in. /sec. @ 27.8 Hz	0.005 in. /sec. @ 27.8 Hz	1 % of 0.75 in./sec.	76 dB 0.0001 psi	Location 8
3/14/06	10:38 a.m.	26,717	<0.050 in./sec.	<0.050 in./sec.	<0.050 in./sec.	N/A	---	Location 9
3/14/06	10:38 a.m.	10,190	<0.020 in./sec.	<0.020 in./sec.	<0.020 in./sec.	N/A	---	Location 10
3/23/06	11:08 a.m.	361	0.965 in. /sec. @ 11.9 Hz.	0.858 in. /sec. @ 16.7 Hz	0.760 in. /sec. @ 27.8 Hz	Exceeds 0.75 in./sec.	129 dB 0.0082 psi	Location 1
3/23/06	11:08 a.m.	1,320	0.160 in. /sec. @ 27.8 Hz	0.148 in. /sec. @ 16.7 Hz	0.278 in. /sec. @ 33.3 Hz	16.8 % of 1.65 in./sec.	114 dB 0.0016 psi	Location 2
3/23/06	11:08 a.m.	2,798	0.083 in. /sec. @ 20.8 Hz	0.068 in. /sec. @ 6.4 Hz	0.053 in. /sec. @ 18.5 Hz	8 % of 1.00 in./sec.	104 dB 0.0006 psi	Location 3
3/23/06	11:08 a.m.	5,650	0.025 in. /sec. @ 16.7 Hz	0.023 in. /sec. @ 9.3 Hz	0.018 in. /sec. @ 33.3 Hz	3.1 % of 0.80 in./sec.	97 dB 0.0002 psi	Location 4
3/23/06	11:08 a.m.	8,184	0.013 in. /sec. @ 20.8 Hz	0.025 in. /sec. @ 20.8 Hz	0.015 in. /sec. @ 20.8 Hz	2.5 % of 1.00 in./sec.	86 dB 0.0001 psi	Location 5
3/23/06	11:08 a.m.	8,395	0.033 in. /sec. @ 18.5 Hz	0.015 in. /sec. @ 20.8 Hz	0.013 in. /sec. @ 20.8 Hz	3.7 % of 0.90 in./sec.	89 dB 0.0002 psi	Location 6
3/23/06	11:08 a.m.	9,451	0.013 in. /sec. @ 16.7 Hz	0.010 in. /sec. @ 18.5 Hz	0.008 in. /sec. @ 23.8 Hz	1.6 % of 0.80 in./sec.	105 dB 0.0006 psi	Location 7
3/23/06	11:08 a.m.	17,688	0.005 in. /sec. @ 18.2 Hz	0.008 in. /sec. @ 15.2 Hz	0.003 in. /sec. @ 12.8 Hz	1 % of 0.75 in./sec.	89 dB 0.0002 psi	Location 8
3/23/06	11:08 a.m.	26,875	<0.010 in./sec.	<0.010 in./sec.	<0.010 in./sec.	N/A	---	Location 9
3/23/06	11:08 a.m.	10,032	0.010 in. /sec. @ 23.8 Hz	0.010 in. /sec. @ 20.8 Hz	0.015 in. /sec. @ 27.8 Hz	1.1 % of 1.35 in./sec.	86 dB 0.0001 psi	Location 10
4/6/06	11:52 a.m.	294	5.120 in. /sec. @ 55.6 Hz	2.343 in. /sec. @ 12.8 Hz	2.398 in. /sec. @ 27.8 Hz	Exceeds 2.00 in./sec.	127 dB 0.0065 psi	Location 1
4/6/06	11:52 a.m.	1,109	0.315 in. /sec. @ 27.8 Hz	0.228 in. /sec. @ 20.8 Hz	0.255 in. /sec. @ 41.7 Hz	23 % of 1.35 in./sec.	116 dB 0.0018 psi	Location 2
4/6/06	11:52 a.m.	2,587	0.103 in. /sec. @ 16.7 Hz	0.080 in. /sec. @ 18.5 Hz	0.085 in. /sec. @ 33.3 Hz	12.9 % of 0.80 in./sec.	106 dB 0.0007 psi	Location 3
4/6/06	11:52 a.m.	5,386	0.028 in. /sec. @ 9.3 Hz	0.033 in. /sec. @ 20.8 Hz	0.018 in. /sec. @ 41.7 Hz	3.3 % of 1.00 in./sec.	100 dB 0.003 psi	Location 4
4/6/06	11:52 a.m.	7,920	0.020 in. /sec. @ 16.7 Hz	0.020 in. /sec. @ 18.5 Hz	0.015 in. /sec. @ 27.8 Hz	2.5 % of 0.80 in./sec.	86 dB 0.0001 psi	Location 5
4/6/06	11:52 a.m.	8,184	0.028 in. /sec. @ 18.5 Hz	0.015 in. /sec. @ 23.8 Hz	0.015 in. /sec. @ 20.8 Hz	3.1 % of 0.90 in./sec.	89 dB 0.0002 psi	Location 6
4/6/06	11:52 a.m.	9,662	0.013 in. /sec. @ 20.8 Hz	0.008 in. /sec. @ 20.8 Hz	0.010 in. /sec. @ 23.8 Hz	1.3 % of 1.00 in./sec.	100 dB 0.0003 psi	Location 7
4/6/06	11:52 a.m.	17,688	0.010 in. /sec. @ 10.4 Hz	0.008 in. /sec. @ 11.1 Hz	0.005 in. /sec. @ 33.3 Hz	1.3 % of 0.75 in./sec.	79 dB 0.0001 psi	Location 8

Date	Time	Distance (ft.)	Longitudinal (in. /sec.)	Transverse (in. /sec.)	Vertical (in. /sec.)	Percent of State Limit	Airblast dB / psi	Recording Location
4/6/06	11:52 a.m.	26,981	0.005 in. /sec. @ 27.8 Hz	0.005 in. /sec. @ 33.3 Hz	0.005 in. /sec. @ 41.7 Hz	< 1 % of 1.35 in./sec.	78 dB 0.0001 psi	Location 9
4/6/06	11:52 a.m.	9,821	0.013 in. /sec. @ 27.8 Hz	0.013 in. /sec. @ 18.5 Hz	0.020 in. /sec. @ 33.3 Hz	1.2 % of 1.35 in./sec.	81 dB 0.0001 psi	Location 10
4/20/06	11:50 a.m.	265	3.465 in. /sec. @ 27.8 Hz	1.180 in. /sec. @ 18.5 Hz	1.730 in. /sec. @ 33.3 Hz	Exceeds 2.00 in./sec.	131 dB 0.0110 psi	Location 1
4/20/06	11:50 a.m.	898	0.220 in. /sec. @ 27.8 Hz	0.168 in. /sec. @ 23.8 Hz	0.258 in. /sec. @ 20.8 Hz	25.8 % of 1.00 in./sec.	118 dB 0.0023 psi	Location 2
4/20/06	11:50 a.m.	2,376	0.100 in. /sec. @ 15.2 Hz	0.078 in. /sec. @ 20.8 Hz	0.075 in. /sec. @ 20.8 Hz	13.3 % of 0.75 in./sec.	110 dB 0.0010 psi	Location 3
4/20/06	11:50 a.m.	5,174	0.035 in. /sec. @ 19.2 Hz	0.028 in. /sec. @ 16.7 Hz	0.015 in. /sec. @ 41.7 Hz	3.7 % of 0.95 in./sec.	102 dB 0.0004 psi	Location 4
4/20/06	11:50 a.m.	7,709	0.020 in. /sec. @ 10.4 Hz	0.010 in. /sec. @ 23.8 Hz	0.010 in. /sec. @ 23.8 Hz	2.7 % of 0.75 in./sec.	94 dB 0.0002 psi	Location 5
4/20/06	11:50 a.m.	7,920	0.018 in. /sec. @ 11.1 Hz	0.013 in. /sec. @ 13.9 Hz	0.010 in. /sec. @ 33.3 Hz	24 % of 0.75 in./sec.	101 dB 0.0003 psi	Location 6
4/20/06	11:50 a.m.	9,874	0.015 in. /sec. @ 11.9 Hz	0.008 in. /sec. @ 12.8 Hz	0.008 in. /sec. @ 27.8 Hz	2 % of 0.75 in./sec.	97 dB 0.0002 psi	Location 7
4/20/06	11:50 a.m.	17,635	0.008 in. /sec. @ 6.4 Hz	0.005 in. /sec. @ 27.8 Hz	0.005 in. /sec. @ 33.3 Hz	1 % of 0.75 in./sec.	89 dB 0.0002 psi	Location 8
4/20/06	11:50 a.m.	27,086	<0.005 in./sec.	<0.005 in./sec.	<0.005 in./sec.	N/A	---	Location 9
4/20/06	11:50 a.m.	9,610	0.013 in. /sec. @ 11.1 Hz	0.010 in. /sec. @ 7.2 Hz	0.013 in. /sec. @ 27.8 Hz	1.7 % of 0.75 in./sec.	95 dB 0.0002 psi	Location 10

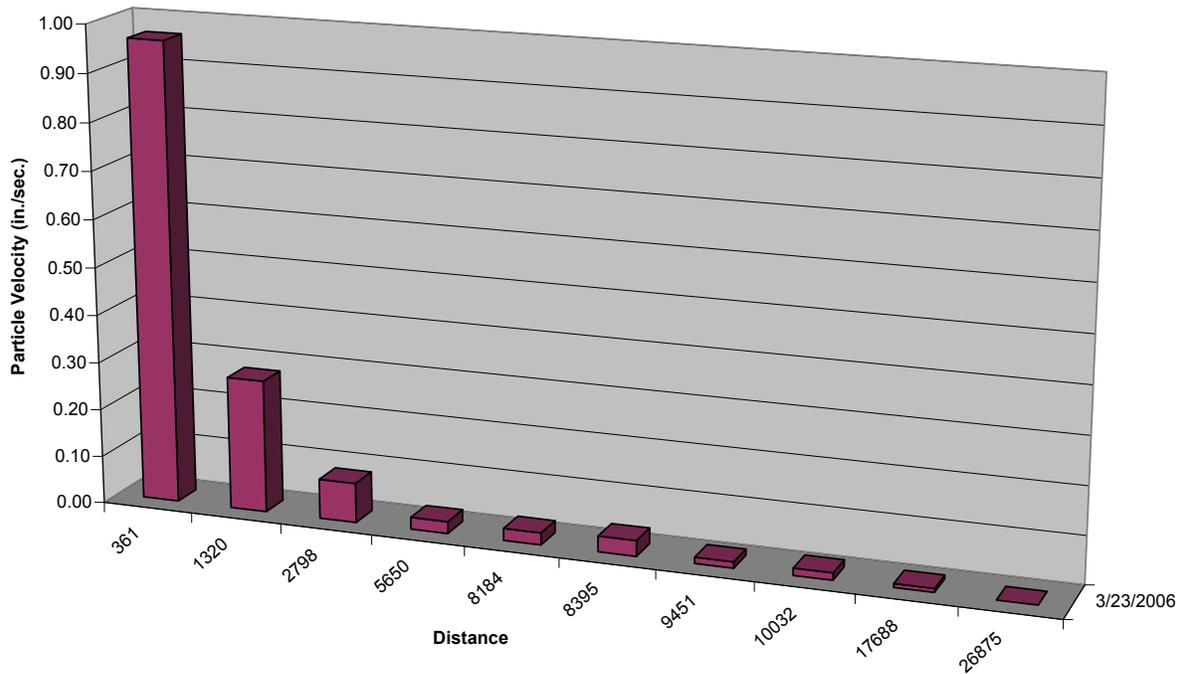
The ground vibration level information is best presented in graphic form to understand the vibration level attenuation with distance. The following graphs show the vibration reduction based upon distance from the blast.

Titan America, LLC  
King Road Exploratory Pit  
Test Blast No. 1



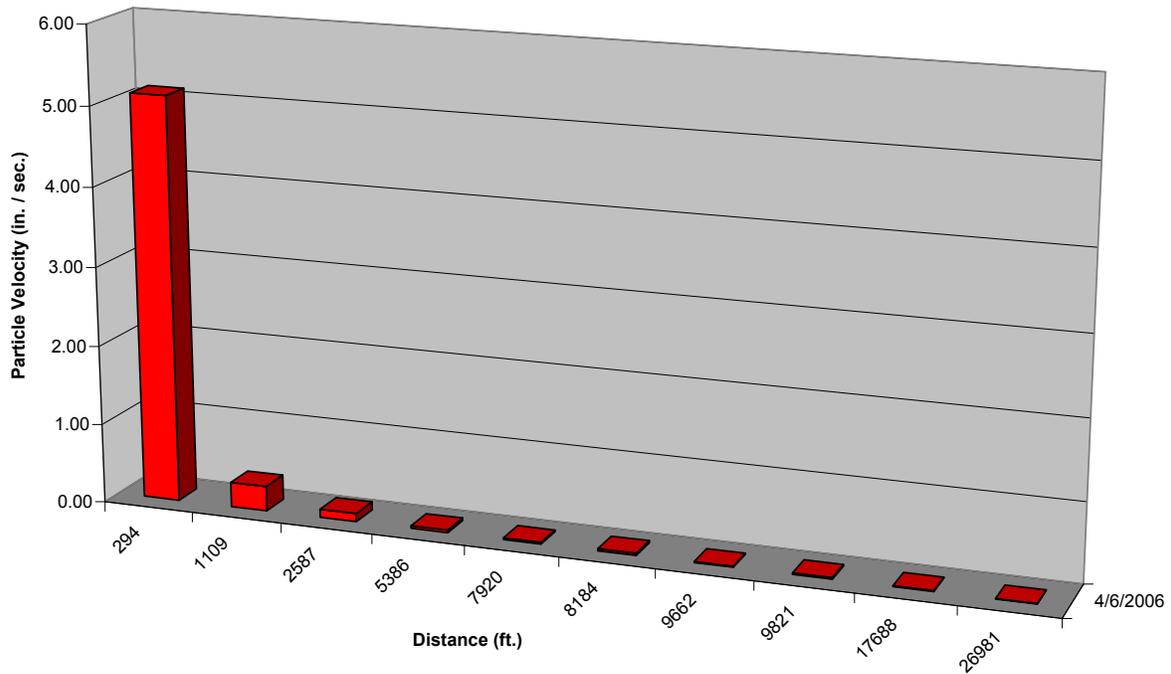
The maximum blast levels measured reduced consistently from the maximum at 500 feet of 0.74 inch per second to less than 0.20 inch per second at 1,531 feet. The levels in all cases were below the most restrictive limits of the State of Florida for drywall homes in Florida, 0.75 inch per second.

**Titan America, LLC  
King Road Exploratory Pit  
Test Blast No. 2**



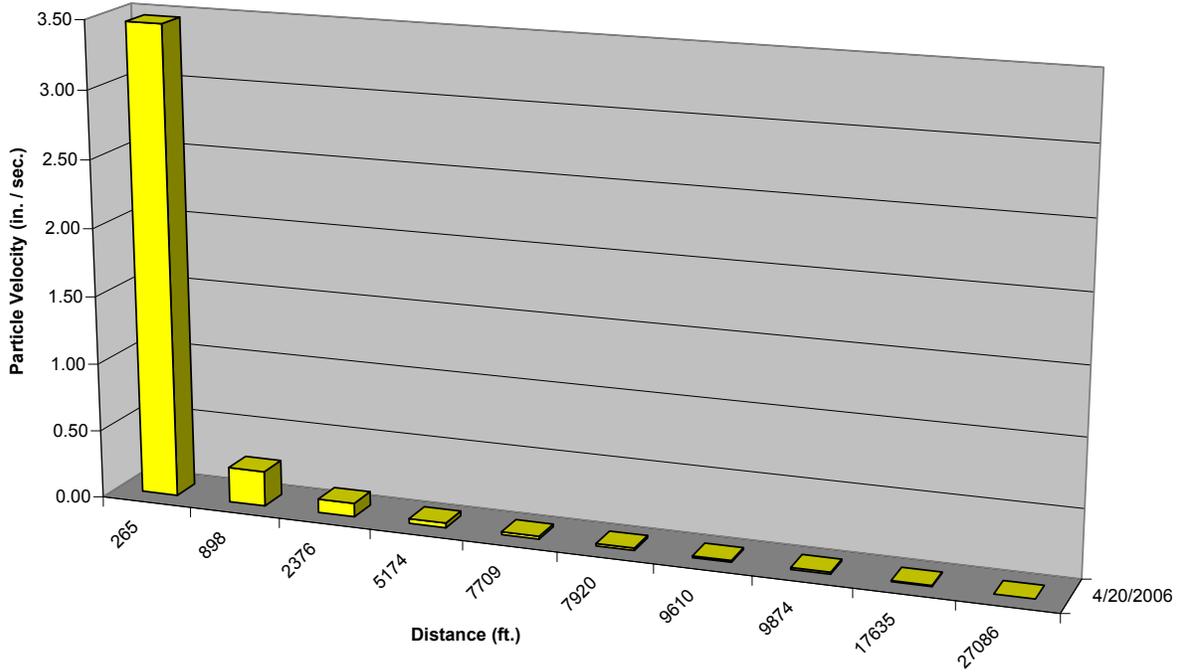
Test Blast No. 2 generally follows the trend of the initial blast at the site. The levels were reduced from the maximum at the closest recording location as the blast to seismograph distance was reduced. The level at 361 feet (0.965 in. / sec.) exceeded the State regulations based upon the frequency. All other levels were significantly reduced and were well within the State of Florida blast level regulations.

Titan America, LLC  
King Road Exploratory Pit  
Test Blast No. 3



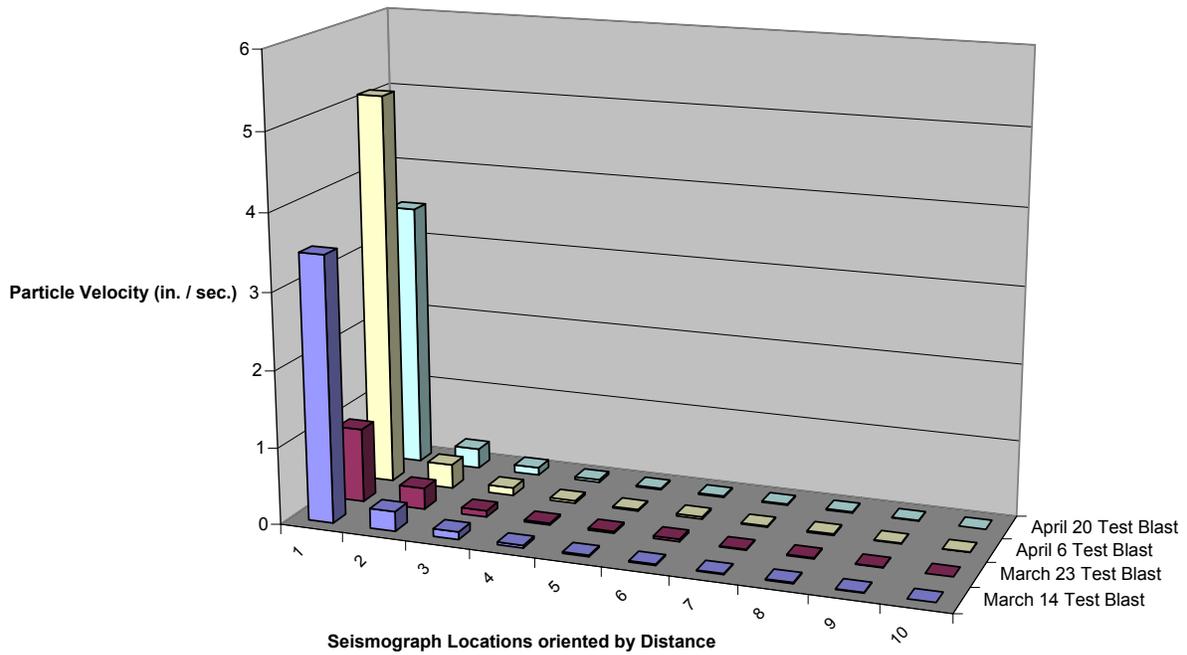
Test Blast No. 3 produced levels at 294 feet of 5.120 inch per second. This was measured due to blast orientation and the location of the instrument immediate north of the blast. Although initially higher at the closest distance, the levels attenuated at 1,109 feet to be consistent with the prior blasts and were well below any threshold of the State.

**Titan America, LLC  
King Road Exploratory Pit  
Test Blast No. 4**



Test Blast No. 4 was consistent with the remaining blasts and at the closest distance reached a level outside of the State limit due to proximity of the seismograph to the blast. The 3.465 inch per second level did attenuate as with all other blasts to a level within the State of Florida regulations at the second recording location. The 898-foot measurement was 0.22 inch per second and represented a significant reduction in velocity.

**Titan America, LLC  
King Road Exploratory Pit  
Overall Test Blast Comparison**

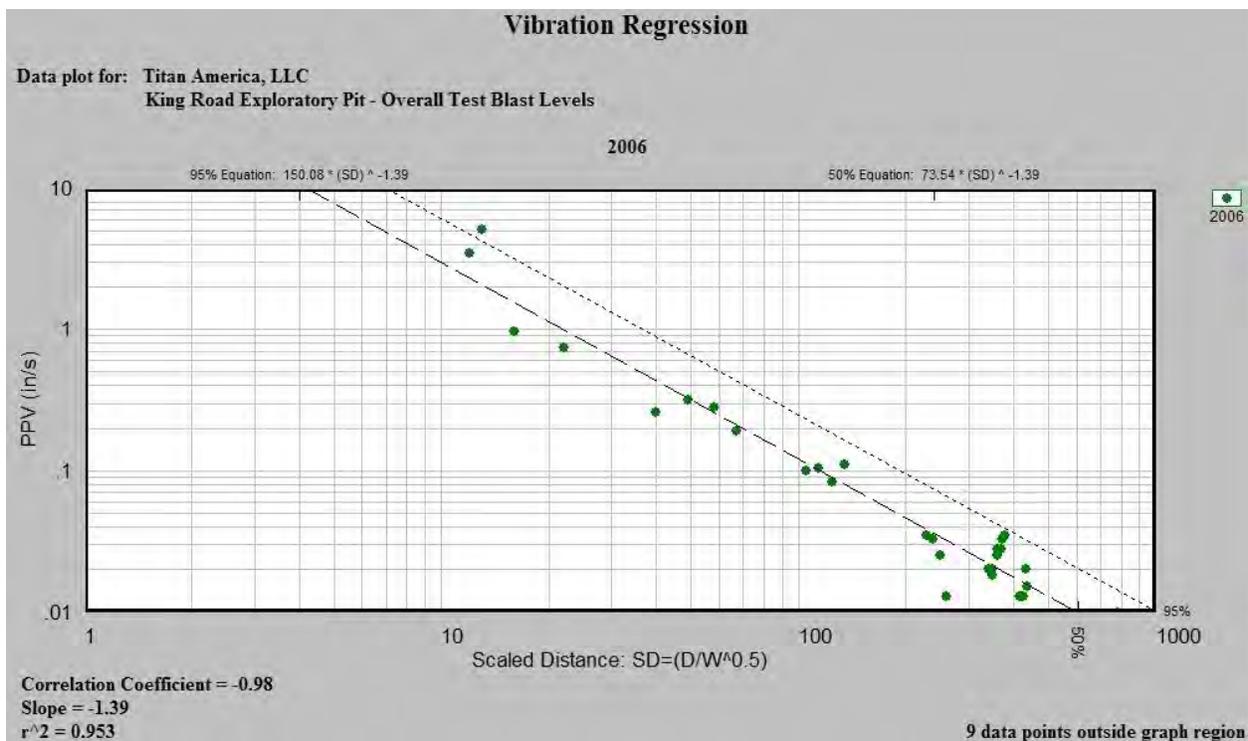


The chart above plots all of the vibration measurements recorded during the four test blasts detonated at the exploratory pit. Since the closest instruments produced relatively high vibration levels, the remaining levels on the graph appear as limited peak particle velocity.

## VIBRATION PROJECTIONS

This evaluation is prepared to assess ground vibration at remote locations. In order to make the projections Regression Analysis is necessary. Regression analysis is a statistical tool for the investigation of relationships between variables. In vibration level analysis, the variables used are the vibration level measurements themselves, explosive charge weight per delay and the blast to seismograph distance. For this summary, a regression evaluation was made for each blast as well as all of the levels combined. Using the evaluation techniques a mathematical formula is produced which represents the “best fit” of the data. This formula is then used to project ground vibration to locations not measured with seismographs.

The overall summary of the ground vibration levels is shown below.



The vibration projection completed by GeoSonics, Inc. plots particle velocity on the vertical axis versus Scaled Distance, on the horizontal axis. Scaled Distance (SD) is a relationship of the distance from the blast to the seismograph divided by the square root of the maximum charge weight per delay. This relationship allows for the comparison of blasts with varying charge weights and distances. It is commonly used in vibration evaluation.

From the regression analysis performed, a projection formula was generated. The formula listed as the 50% probability formula is used to project ground vibration. This formula is:

$$\text{Peak Particle Velocity} = 150.08 * (\text{Scaled Distance})^{-1.39}$$

The information in the chart also indicates a correlation coefficient of -0.98. This is a very good relationship of vibration to blast charge weight and would accurately predict off site vibration.

Based upon the aforementioned formula, off-site projections have been made to key structures. The distances measured are based upon the operation maintained west of the Florida Power Corporation transmission line right-of-way and the southern border being north of Shirley Road. Specifically, the projections are calculated from Mining Area Nos. 1, 5 and 18 – 19 from the March 19, 2010 revision of the Mine Plan. Distances and key properties are based upon property ownership documents reviewed for this report.

**Vibration Projection Table**

<b>Location</b>	<b>Distance (ft.) Mining Area</b>	<b>Projected Ground Vibration Level</b>	<b>Percent of State Limit for Drywall (0.75 in. /sec.)</b>	<b>Comment</b>
Crichton Property	2,864 Area 1	0.180 in. / sec.	24%	King Road at SE 72 Court
Crichton Property	2,843 Area 5	0.182 in. / sec.	24%	King Road at SE 72 Court
R. L. Jones Residence	2,815 Area 1	0.185 in. / sec.	24.6%	South of King Road on S. E. 72 <sup>nd</sup> Court
E. Slattery Residence	3,045 Area 1	0.177 in. / sec.	16.5%	South of King Road on S. E. 72 <sup>nd</sup> Court
Residence northeast of King Road and 72 <sup>nd</sup> Court	3,187 Area 5	0.155 in. / sec.	20.7%	-
Florida Sheriff's Youth Ranch	3,524 Area 5	0.142 in. / sec.	13.5%	-
Residence / Youth Ranch Structure with Pool	3,368 Area 5	0.144 in. / sec.	19.1%	-
Residences north of County Road 40-A south of the initial key cut	13,808 Area 1	0.020 in. / sec.	2.6%	Distance measured from initial key cut
Deerhaven Campsites area	12,870	0.022 in. / sec.	2.9%	Distance measured from initial key cut

For mining in areas located within the southwest section of the mine plan, modifications to the blasting pattern used will be adjusted for the proximity of structures located in the area now occupied by the Deerhaven Campsites. Vibration levels at approximately 1,000' from the site to the closest existing structure in 2010 would produce levels of 0.77 inch per second for the maximum charge weight per delay. Due to the length of time involved to reach this area for mining, multiple options for explosives pattern and products would be considered. Using the simplest method of reducing the blast hole diameter from 4½ inch to 4.0 inch, a reduction in pounds per delay would be achieved. Using 408.6 pounds per delay, a level of 0.66 inch per second would be predicted. This level represents 88.3% of the current limit of 0.75 inch per second of the State statute.

Based upon the projections made for the initial key cut, the levels at adjacent homes will fall substantially within the State of Florida guidelines for vibration levels. Levels for the closest point of the project will meet standards and have the potential for reduction with modification of the blast pattern.

## **CONCLUSION**

The measurements made for the King Road Exploratory pit indicated that the operation may blast successfully for a major mining operation and will maintain levels far less than established by the State of Florida. The levels projected to off-site structures will not be capable of damage and, in our opinion, will not create annoyance to the few structures in the vicinity.

Respectfully Submitted  
GeoSonics, Inc.

A handwritten signature in black ink, appearing to read 'J.A. Straw', with a long horizontal line extending to the right.

Jeffrey A. Straw  
Vice President and Area Manager



**APPENDIX M**  
**INTEGRITY OF BERMS**





Ardaman & Associates, Inc.

Geotechnical, Environmental and  
Materials Consultants

September 10, 2012  
File Number 05-086

Tarmac America, LLC  
455 Fairway Drive  
Deerfield Beach, FL 33441

Attention: Cindy Burns

Subject: Response To Comment on Draft EIS, Levy County Mine, Tarmac America, LLC,  
Levy County, Florida

Dear Ms. Burns,

As requested, Ardaman & Associates, Inc., has prepared a response to the following comment to the Draft EIS.

*Comment: No data is provided upon which to support the thesis that earthen berms might survive intact through TS-CAT 2 tropical storm events. Given the failure of robust levee structures in New Orleans during the landfall of Hurricane Katrina and that those structures were intended to protect against the specific intensity present in that storm, there is absolutely no reason to expect earthen structures to prevail in such circumstances. The design criterion for such structures around mine lake pits is the 100 year storm event, not tropical storm impacts. Tropical storm events in this region are not a statistical risk, they are a certainty. In order that a permit for this project be properly founded it is necessary that known risks be fully evaluated.*

Response: The height of the earthen berms surrounding the mine pits (lakes) at the proposed Tarmac Levy County Mine was not selected based on the 100-year rainfall event. The height of the berms was based on an analysis of storm tides and expected flood levels resulting from tropical hurricanes. Over the past 160 years, the northwest coast of Florida has experienced 57 hurricanes, 14 of which have been major hurricanes (CAT 3 or higher).

There are three tide gages located along the west coast of Florida in the vicinity of the proposed mine that have long-term tide data: Station No. 8727520 (Cedar Key, Florida), Station No. 8726724 (Clearwater Beach, Florida), and Station No. 8726520 (St. Petersburg, Florida). Cedar Key is approximately 20 nautical miles from the site. The tidal data at these sites are collected and compiled by the National Oceanic and Atmospheric Administration (NOAA) and are available on their web site. The maximum annual tide data for these three stations were analyzed by NOAA to determine the storm tide with a 1% probability (100-year return). The annual exceedance probability curves for each station are provided in Appendix I. The projected storm tides for the 100-year return period at the 95% confidence level are summarized in Table 1.

Table 1  
Projected Storm Tide

Station	100-year Storm Tide (ft, NGVD)
Cedar Key	11.2
Clearwater Beach	12.0
St. Petersburg	9.9

These values are consistent with the storm surge expected for a Category 2 hurricane, i.e., 6 to 8 ft (note that storm tide is storm surge plus MHHW, which for the project area is about 2.3 feet NGVD).

The proposed height of the earthen berms surrounding the mine pits is 19 feet, NGVD. This is much higher than required for the 100-year return period storm tide and is also greater than the flood levels reported on the FEMA flood maps for the project site (See Appendix II).

Because the area is heavily wooded, potential wave action on the exterior of the berm during a hurricane would be greatly diminished. The berms will be constructed of limerock excavated on-site and have 3H:1V side slopes. Wave erosion, if any, should be minor.

The wave height on a typical pond inside the bermed areas, computed for a 100-mph sustained wind speed, is less than 3 feet. These waves will not break against the earthen berm. The waves will break on the 100-ft wide work area located between the pond and the inside toe of the earthen berm. The proposed work area is essentially flat at an elevation 3 feet above the normal pond level.

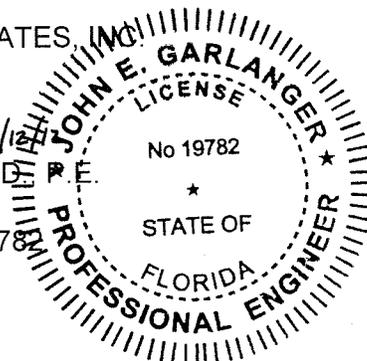
It should be noted that the performance of the earthen berms will need to be evaluated on a regular basis, e.g., every five years, and the design modified as necessary as more information becomes available. For example, as more annual tide data become available, the storm tide analysis should be updated. The FEMA maps are also typically updated every 5 to 6 years as improvements are made in storm surge modeling and should be reviewed before designing or constructing future earthen berm.

We trust that the included data and analysis meet your immediate needs. If you have any questions, please contact the undersigned.

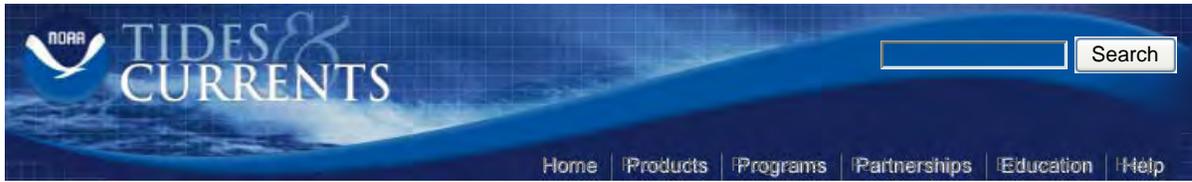
Very truly yours,  
ARDAMAN & ASSOCIATES, INC.



John E. Garlanger, Ph.D.  
Senior Consultant  
Florida License No. 19782



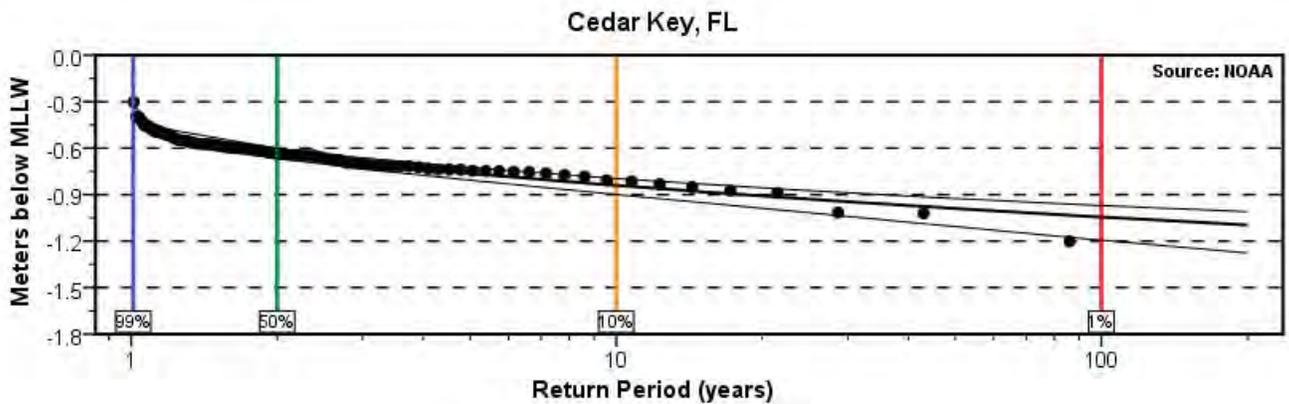
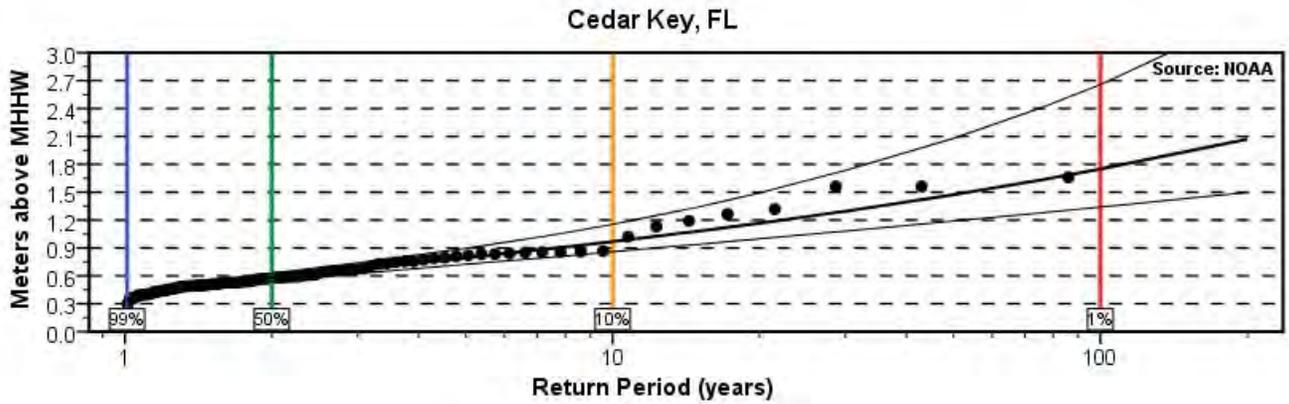
Appendix I  
Probability Distribution Curves



- Extreme Water Levels
- Alabama
- Alaska
- California
- Connecticut
- Delaware
- Florida
- Georgia
- Hawaii
- Louisiana
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- Oregon
- Rhode Island
- South Carolina
- Texas
- Virginia
- Washington
- Washington DC
- Island Stations

## Annual Exceedance Probability Curves 8727520 Cedar Key, Florida

The annual exceedance probability curves with 95% confidence intervals shown below indicate the highest and lowest water levels as a function of return period in years. The dots indicate the annual highest or lowest water levels after the Mean Sea Level trend was removed, which were used to calculate the curves. The levels are in meters relative to the Mean Higher High Water (MHHW) or Mean Lower Low Water (MLLW) datums established by CO-OPS (1 foot = 0.3 meters). The position of the rightmost dot indicates the number of years of data used in the calculation.



- Sea Level Trend Table in mm/yr
- Sea Level Trend Table in feet/century
- Main Page

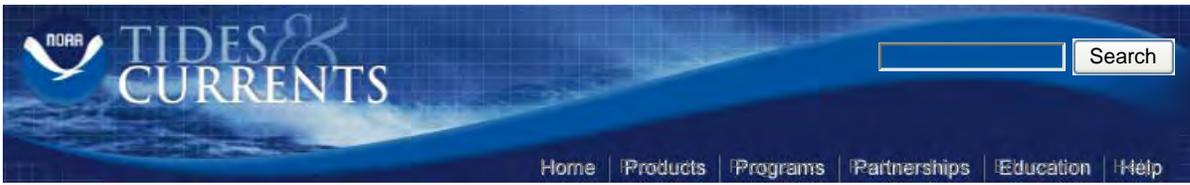
The curves were calculated using the [ExtremesToolkit](#) software package which fits the three parameters of the Generalized Extreme Value (GEV) probability distribution function to annual maximum or annual minimum data using an iterative maximum likelihood estimation. The spread of the 95% confidence intervals depends on the variability of the source data and the length of the series used. The level of confidence in the exceedance probability level decreases with longer return periods and should always be used in conjunction with the estimate in the application of these data. The estimated uncertainty in the elevation of the tidal datums (MHHW and MLLW) is less than 0.01 meter.

[Extreme Water Levels](#)

[Seasonal variation of exceedance probability levels](#)

[Tidal datums and exceedance probability levels relative to mean sea level](#)

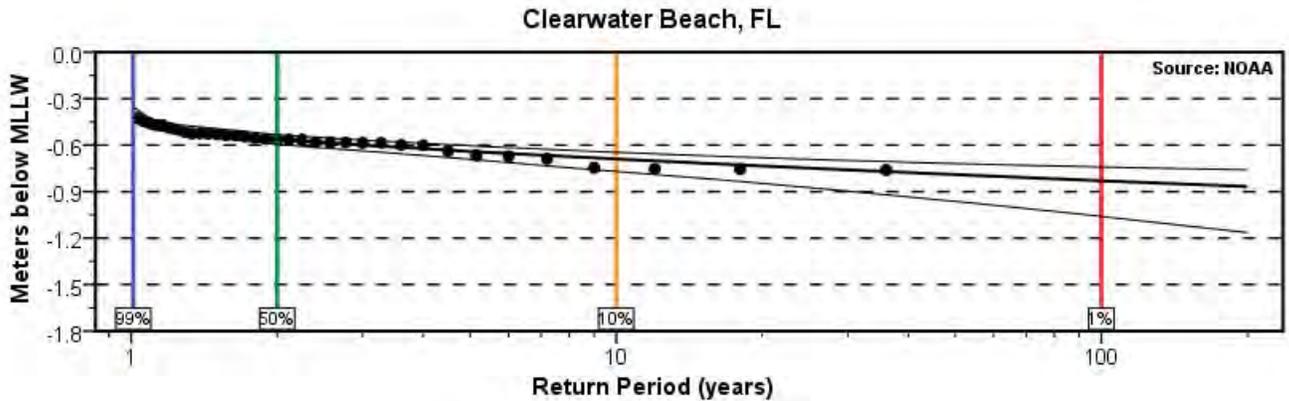
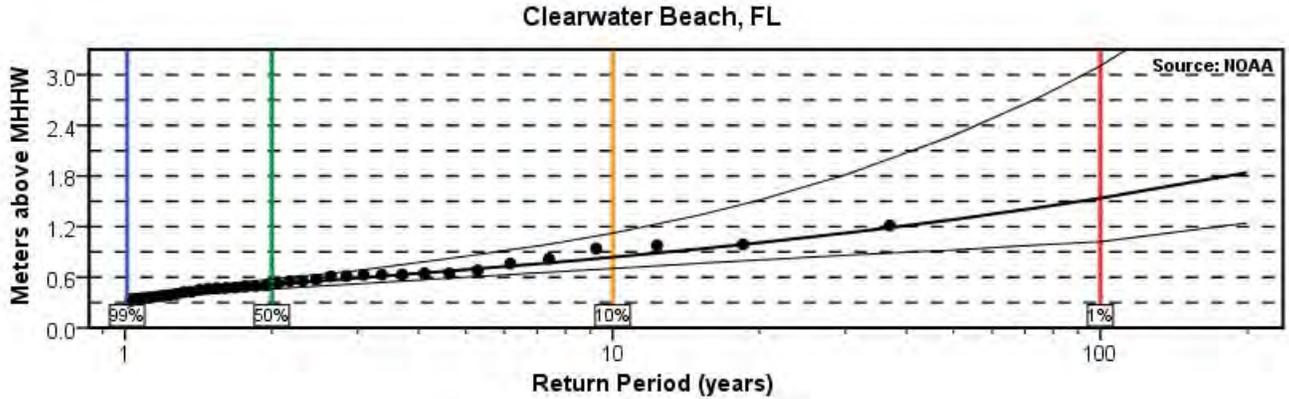
[Back to Extreme Water Levels Main Page](#)



## Annual Exceedance Probability Curves 8726724 Clearwater Beach, Florida

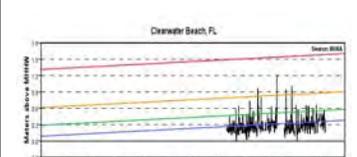
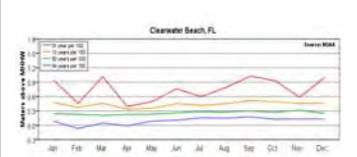
- Extreme Water Levels
- Alabama
- Alaska
- California
- Connecticut
- Delaware
- Florida
- Georgia
- Hawaii
- Louisiana
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- Oregon
- Rhode Island
- South Carolina
- Texas
- Virginia
- Washington
- Washington DC
- Island Stations

The annual exceedance probability curves with 95% confidence intervals shown below indicate the highest and lowest water levels as a function of return period in years. The dots indicate the annual highest or lowest water levels after the Mean Sea Level trend was removed, which were used to calculate the curves. The levels are in meters relative to the Mean Higher High Water (MHHW) or Mean Lower Low Water (MLLW) datums established by CO-OPS (1 foot = 0.3 meters). The position of the rightmost dot indicates the number of years of data used in the calculation.

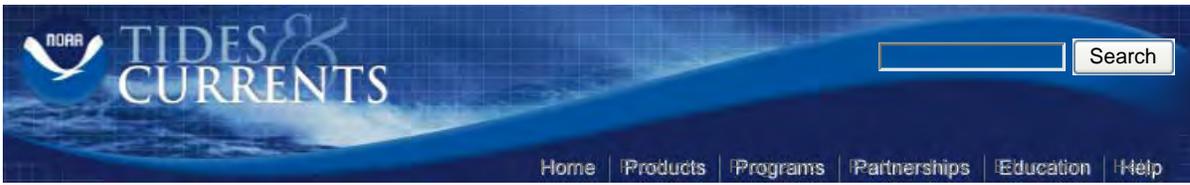


- Sea Level Trend Table in mm/yr
- Sea Level Trend Table in feet/century
- Main Page

The curves were calculated using the [ExtremesToolkit](#) software package which fits the three parameters of the Generalized Extreme Value (GEV) probability distribution function to annual maximum or annual minimum data using an iterative maximum likelihood estimation. The spread of the 95% confidence intervals depends on the variability of the source data and the length of the series used. The level of confidence in the exceedance probability level decreases with longer return periods and should always be used in conjunction with the estimate in the application of these data. The estimated uncertainty in the elevation of the tidal datums (MHHW and MLLW) is less than 0.01 meter.

 <p><a href="#">Extreme Water Levels</a></p>	 <p><a href="#">Seasonal variation of exceedance probability levels</a></p>	 <p><a href="#">Tidal datums and exceedance probability levels relative to mean sea level</a></p>
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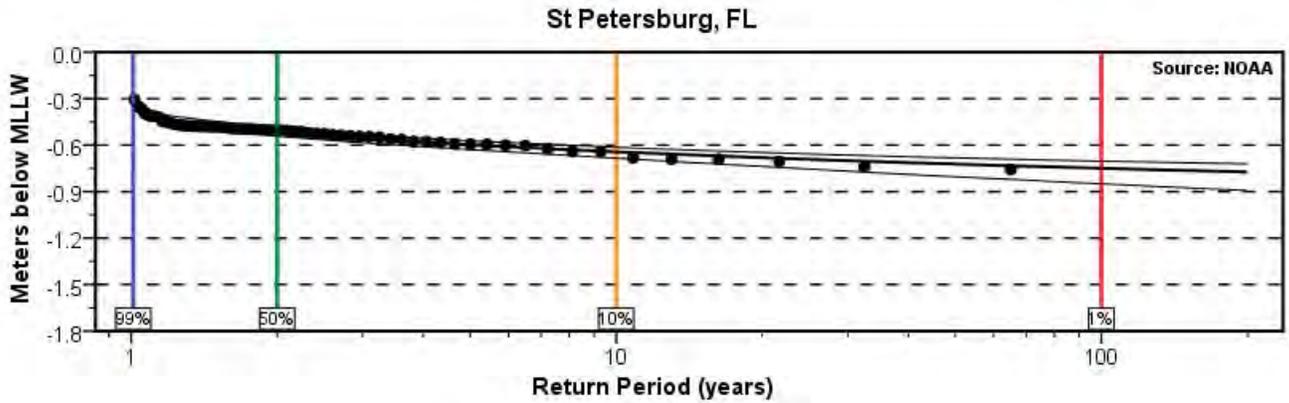
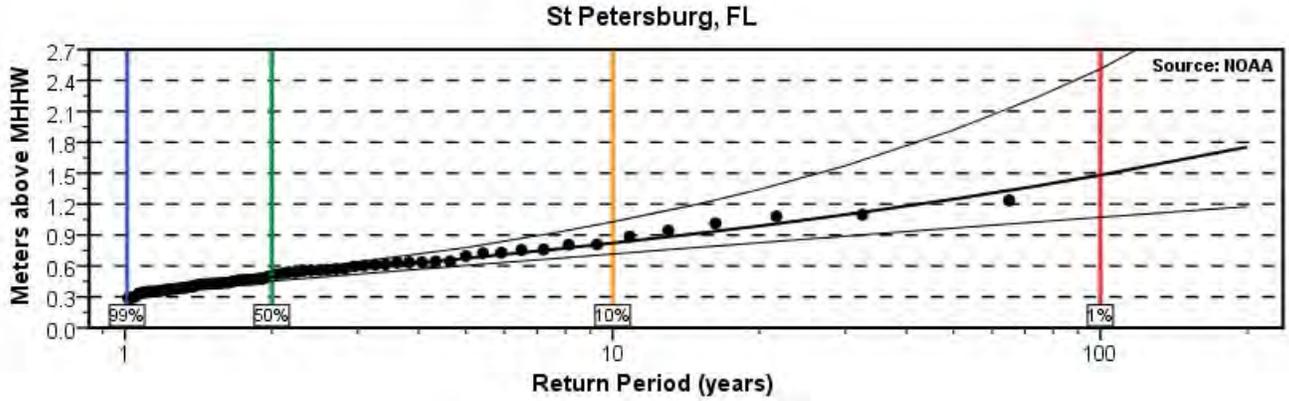
[Back to Extreme Water Levels Main Page](#)



- Extreme Water Levels
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- Virginia
- Washington
- Washington DC
- Island Stations

## Annual Exceedance Probability Curves 8726520 St. Petersburg, Florida

The annual exceedance probability curves with 95% confidence intervals shown below indicate the highest and lowest water levels as a function of return period in years. The dots indicate the annual highest or lowest water levels after the Mean Sea Level trend was removed, which were used to calculate the curves. The levels are in meters relative to the Mean Higher High Water (MHHW) or Mean Lower Low Water (MLLW) datums established by CO-OPS (1 foot = 0.3 meters). The position of the rightmost dot indicates the number of years of data used in the calculation.



- Sea Level Trend Table in mm/yr
- Sea Level Trend Table in feet/century
- Main Page

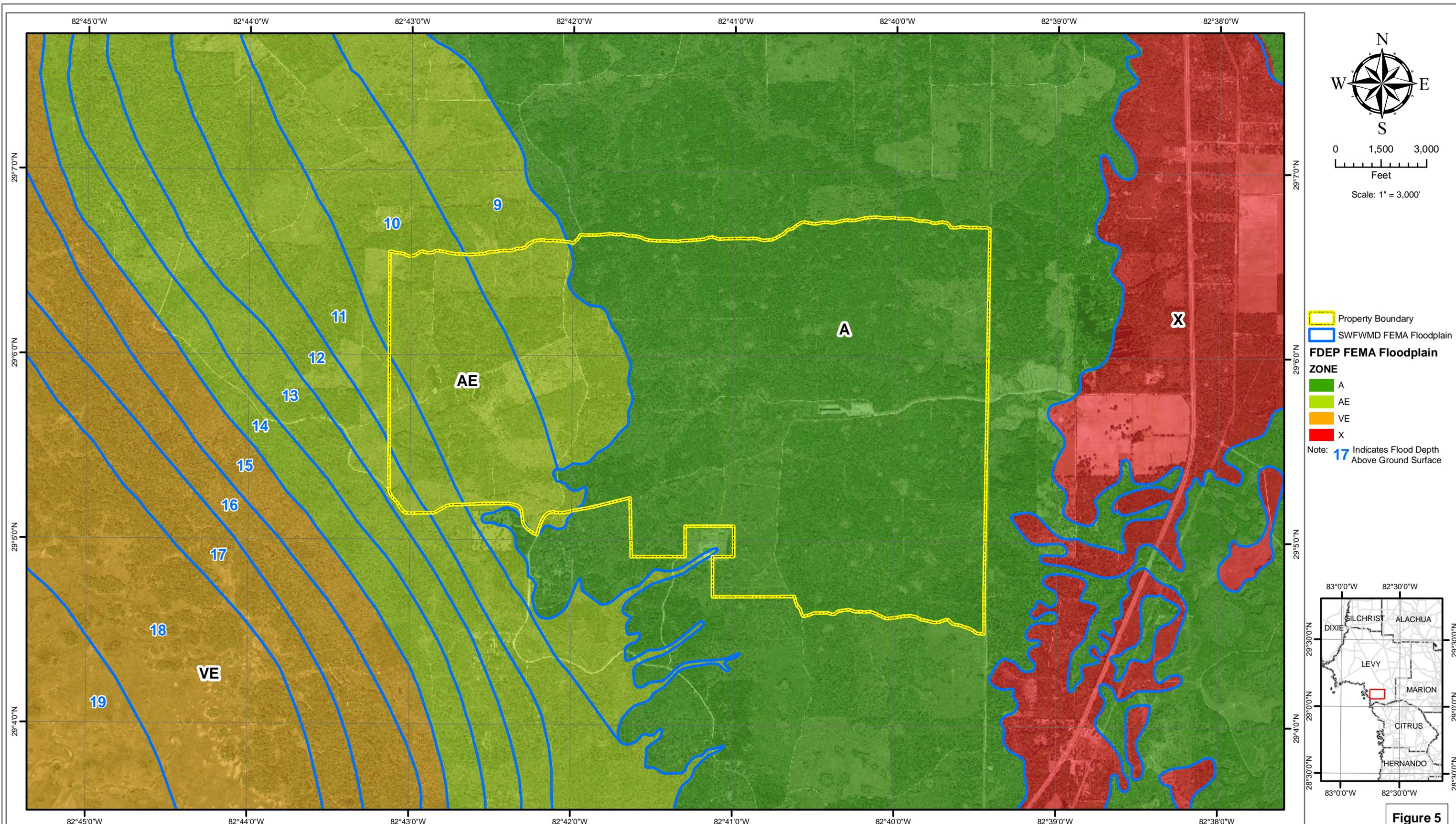
The curves were calculated using the [ExtremesToolkit](#) software package which fits the three parameters of the Generalized Extreme Value (GEV) probability distribution function to annual maximum or annual minimum data using an iterative maximum likelihood estimation. The spread of the 95% confidence intervals depends on the variability of the source data and the length of the series used. The level of confidence in the exceedance probability level decreases with longer return periods and should always be used in conjunction with the estimate in the application of these data. The estimated uncertainty in the elevation of the tidal datums (MHHW and MLLW) is less than 0.01 meter.

 <a href="#">Extreme Water Levels</a>	 <a href="#">Seasonal variation of exceedance probability levels</a>	 <a href="#">Tidal datums and exceedance probability levels relative to mean sea level</a>
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[Back to Extreme Water Levels Main Page](#)

Appendix II  
FEMA Flood Map





**Disclaimer**  
 Ardaman & Associates used the following data "as is" and makes no representation as to the accuracy of the data:  
 IMAGERY SWFWMD 2008  
 FEMA FLOODPLAINS FDEP/SWFWM 1988/1988  
 Project: 05-086A Projection: State Plane Florida West  
 Prepared: 09-10-08 Horizontal Datum: NAD83 Vertical Datum: N/A  
 Prepared by: RMC Modified by: RMC Modified: 03-31-09  
 File: \\05-086\ArcGIS\ArcLayouts\20090331\Figure 5 FEMA Floodplain Map.mxd

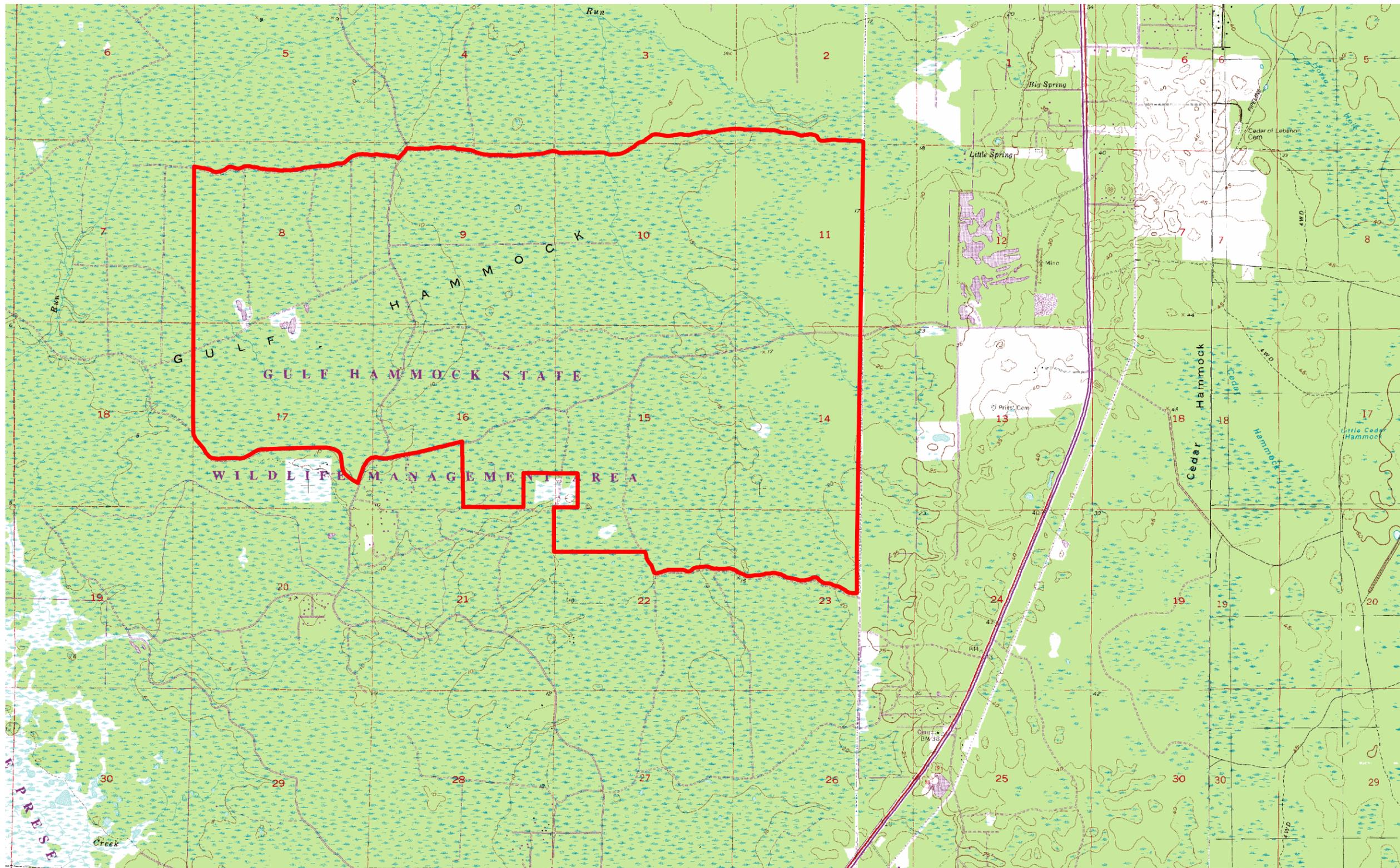
## FEMA FLOODPLAIN MAP

KING ROAD MINE  
 TARMAC AMERICA LLC  
 LEVY COUNTY, FLORIDA

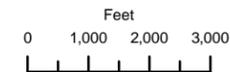
**Ardaman & Associates, Inc.**  
 Geotechnical, Environmental and  
 Materials Consultants  
 Phone: 407-855-3860 Fax: 407-859-8121  
 8008 South Orange Avenue  
 Orlando, Florida 32809

**Figure 5**





Scale: 1" = 3,000'



Property Boundary

FIGURE 2

**SITE LOCATION MAP**  
 KING ROAD MINE  
 TARMAC AMERICA LLC  
 LEVY COUNTY, FLORIDA

Project: 05-086	Projection: State Plane Florida West	
Prepared: 08-07-08	Horizontal Datum: NAD83	Vertical Datum: N/A
Prepared by: RMC	Modified by:	Modified:
File: \\_ArcLayouts\20080806- New Report Figures\Figure2 Site Location.mxd		

**Ardaman & Associates, Inc.**  
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 Materials Consultants  
 Phone: 407-855-3860 Fax: 407-859-8121  
 8008 South Orange Avenue  
 Orlando, Florida 32809



**APPENDIX N**  
**WAVE HEIGHT ANALYSIS**





November 26, 2012  
File Number 05-086

Tarmac America, LLC  
455 Fairway Drive  
Deerfield Beach, FL 33441

Attention: Cindy Burns

Subject: Response to Comments on Draft EIS, Levy County Mine, Tarmac America, LLC,  
Levy County, Florida

Dear Ms. Burns,

As requested, Ardaman & Associates, Inc., has prepared a response to two of the clarification items in Edward Sarfert's e-mail dated October 25, 2012. The two items are repeated below for ease of reference.

*1. Ardaman & Associates provided a letter dated 10 September 2012 in response to comments re: the berms that would surround mine pits. Can the methods and calculations used to determine wave height on a typical pond inside the berm be provided? The letter states that a 100-mph sustained wind would generate waves less than 3 feet in height and these would break on the 100-foot wide work area. Cross sections provided to the Corps show that the high water elevation would extend above the height of that work area, and/or would be only 3.25 feet below the berm crest elevation. Please provide clarification on where waves on a typical pond would be expected to break given these elevations, particularly during a tropical storm or hurricane.*

The calculations and the methodology for computing wave height inside the berm are provided in Attachment A. The 100-ft wide work area is intended to be three feet above the seasonal high water level in all mine pit lakes. Extreme rainfall before or during a hurricane could result in the water level in the mine pit lakes rising above the seasonal high water level (SHWL) by less than 1.0 foot. The extreme rainfall water level would still be more than 2 feet below the top of bank (TOB) of the 100-ft wide work area.

The aggregate plant pond is a special case. For the aggregate plant pond, which is also the stormwater pond for the plant, the catchment ratio (catchment area divided by lake area) is much larger than for the mine pit lakes and the water level is expected to rise approximately 1.25 feet above the SHWL to Elevation 14.75 feet or 4.25 feet below the crest of the embankment (Elev. 19.0) and 1.0 foot below the top of bank (TOB). There is no work area between the aggregate plant pond and the toe of the berm. However, there is a 240-ft setback from the plant pond to the toe of the berm. The elevation of this setback area varies from 15.75 at the top of bank at the pond to 16.0 feet at the edge of the swale at the toe of the perimeter berm.

The wave height calculated for the plant pond for a sustained wind speed of 100 mph feet is 2.05 feet. The wind tide (setup) in the plant pond is approximately 0.02 feet. Adding  $\frac{1}{2}$  of the wave height (1.025 feet) and the total wind setup (0.02 feet) to the expected high water level in

the plant pond (14.75 feet) gives an elevation at the crest of the wave of 15.80 feet. Please note that the water level in the pond will still be 0.98 feet below the top of bank. The wave will break before it reaches the edge of the lake (before it reaches the lake bank) and crash onto the 240-ft wide berm. Note that a wave will begin to break when the depth of water below the mid-height of the wave is less than about one-half the height (i.e., the amplitude) of the wave. The water from the breaking wave will travel across the 240-ft wide setback with a height of a few inches but will not affect the inside slope of the perimeter berm. It will be captured in the perimeter swale.

The wave height calculated for Mining Block 9 of the Alternative 7 Mine Plan (the previous calculations were made for Mining Block 9 of the preferred alternative mine plan) for a sustained wind speed of 100 mph is 3.66 feet. The wind tide (setup) in the plant pond is approximately 0.04 feet. Adding  $\frac{1}{2}$  of the wave height (1.83 feet) and the total wind setup (0.04 feet) to the expected high water level in Pit 9 (<16.0 feet) gives an elevation at the crest of the wave of <17.9 feet. Please note that the water level in the pit lake will still be more than 1.96 feet below the top of bank of the work area. The wave will break before it reaches the edge of the pit (before it reaches the lake bank) and crash onto the 100-ft wide berm. The water from the breaking wave will travel across the berm with a height of a few inches but will not affect the inside slope of the perimeter berm.

2. *Ardaman & Associates also noted that erosion would be minimal since the berms would be constructed of limestone. To help address the multiple comments specifically questioning the integrity of those berms, can additional information be provided about the design and construction methods for the berms?*

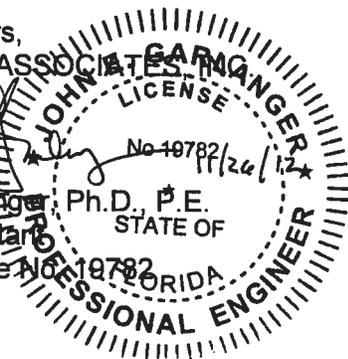
The berms will be designed in accordance with applicable guidelines and good engineering practice prevailing at the time of construction. Among the criteria that are currently anticipated are that the crest of the embankments will be a minimum of 10 feet wide; the inside and outside slopes will have a slope no steeper than 3H:1V (which is flat enough to be stable even with seepage passing through the embankment); the foundation of the embankment will be cleared, stripped and grubbed prior to placing the fill for the embankment; unsatisfactory soil will be removed; and the embankment will be constructed using limestone from the nearest adjacent mine pit (quarry). The method of construction is not yet known. The limestone could be excavated by the mining dragline and cast directly along the alignment of the berm and then shaped using bulldozers or, alternatively, the limestone could be excavated using the mining dragline and hauled in off-road dump trucks to the location of the berm and placed in layers using a bulldozer to shape and compact each lift. The crest and slopes of the berms will not be grassed.

We trust that the above clarifications meet your immediate needs. If you have any questions, please contact the undersigned.

Very truly yours,

ARDAMAN & ASSOCIATES

  
John E. Garland, Ph.D., P.E.  
Senior Consultant  
Florida License No. 19782



**APPENDIX A**  
**Wave Analysis Methodology and Calculations**

## Effective Fetch Calculations

### Plant Pond

length	alpha (deg)	alpha	eff length	L*cos alpha	cos alpha
551	42	0.73	409	304	0.74
618	36	0.63	500	404	0.81
709	30	0.52	614	532	0.87
835	24	0.42	762	696	0.91
1043	18	0.31	992	944	0.95
1460	12	0.21	1428	1397	0.98
1444	6	0.10	1436	1428	0.99
1427	0	0.00	1427	1427	1.00
1444	6	0.10	1436	1428	0.99
1460	12	0.21	1428	1397	0.98
1043	18	0.31	992	944	0.95
835	24	0.42	762	696	0.91
709	30	0.52	614	532	0.87
618	36	0.63	500	404	0.81
551	42	0.73	409	304	0.74

12838      13.5

Effective Fetch= 950  
 Effective Fetch= 0.18 miles

## Effective Fetch Calculations

### Pit Pond 9 (Alternative 7)

length	alpha (deg)	alpha	eff length	L*cos alpha	cos alpha
1765	42	0.73	1312	975	0.74
1998	36	0.63	1616	1308	0.81
2331	30	0.52	2019	1748	0.87
2897	24	0.42	2647	2418	0.91
3896	18	0.31	3705	3524	0.95
5095	12	0.21	4984	4875	0.98
4329	6	0.10	4305	4282	0.99
3963	0	0.00	3963	3963	1.00
4029	6	0.10	4007	3985	0.99
3130	12	0.21	3062	2995	0.98
2098	18	0.31	1995	1898	0.95
1565	24	0.42	1430	1306	0.91
1299	30	0.52	1125	974	0.87
1099	36	0.63	889	719	0.81
966	42	0.73	718	533	0.74
				35502	13.51
				Effective Fetch=	2,628
				Effective Fetch=	0.50 miles

**Calculation of Freeboard  
Tarmac Levy County Mine  
Plant Pond**

wind speed mph	wind speed ft/sec	water depth feet	fetch length feet	wave set up feet	wave height feet	wave period sec	wave length feet	Ho/Lo	R/Ho	Wave Run-up feet	Min Freeboard feet	Critical Elevation Status
20	29.3	110	950	0.00	0.37	1.14	6.64	0.056	1.66	0.62	0.62	OK
30	44.0	110	950	0.00	0.57	1.36	9.49	0.060	1.60	0.91	0.91	OK
40	58.7	110	950	0.00	0.78	1.55	12.22	0.063	1.56	1.21	1.21	OK
50	73.3	110	950	0.00	0.98	1.70	14.88	0.066	1.53	1.50	1.50	OK
60	88.0	110	950	0.00	1.19	1.85	17.46	0.068	1.50	1.79	1.79	OK
70	102.7	110	950	0.01	1.40	1.98	20.00	0.070	1.48	2.08	2.08	OK
77	112.9	110	950	0.01	1.55	2.06	21.75	0.071	1.46	2.27	2.28	OK
90	132.0	110	950	0.01	1.83	2.21	24.95	0.073	1.44	2.64	2.65	OK
100	146.7	110	950	0.01	2.05	2.31	27.38	0.075	1.43	2.92	2.94	OK
110	161.3	110	950	0.01	2.27	2.41	29.77	0.076	1.41	3.20	3.22	OK

(Note: Wave run-up calculated for embankment with 1:3 Slope)

**Using...**

1:3 Slope	
Ho/Lo	R/Ho
0.040	1.900
0.050	1.740
0.060	1.600
0.070	1.480
0.080	1.370

**Table 1:**

1:2 Slope	
Ho/Lo	R/Ho
0.040	2.280
0.050	2.200
0.060	2.140
0.070	2.060
0.080	2.000

**Table 2:**

1:2.5 Slope	
Ho/Lo	R/Ho
0.040	2.110
0.050	1.950
0.060	1.820
0.070	1.740
0.080	1.630

**Table 3:**

1:3 Slope	
Ho/Lo	R/Ho
0.040	1.900
0.050	1.740
0.060	1.600
0.070	1.480
0.080	1.370

**User Defined:**

1:x Slope	
Ho/Lo	R/Ho
0.050	2.200
0.060	2.140
0.070	2.060
0.080	2.000
0.090	1.920

**INPUT**

**Project :** Tarmac Levy County Mine  
**Site:** Plant Pond

**Bottom EI** -100      **Water EI** 10  
**Critical EI** 19      **Fetch:** 950

**Use Table (1, 2, 3, or X for User Defined) :** 3

**Calculation of Freeboard  
Tarmac Levy County Mine  
Pit 9**

wind speed mph	wind speed ft/sec	water depth feet	fetch length feet	wave set up feet	wave height feet	wave period sec	wave length feet	Ho/Lo	R/Ho	Wave Run-up feet	Min Freeboard feet	Critical Elevation Status
20	29.3	110	2628	0.00	0.60	1.51	11.74	0.051	1.72	1.04	1.04	OK
30	44.0	110	2628	0.00	0.92	1.81	16.78	0.055	1.67	1.54	1.54	OK
40	58.7	110	2628	0.01	1.25	2.05	21.61	0.058	1.63	2.04	2.04	OK
50	73.3	110	2628	0.01	1.59	2.27	26.30	0.060	1.60	2.53	2.54	OK
60	88.0	110	2628	0.01	1.92	2.46	30.88	0.062	1.57	3.02	3.04	OK
70	102.7	110	2628	0.02	2.27	2.63	35.36	0.064	1.55	3.51	3.53	OK
77	112.9	110	2628	0.02	2.51	2.74	38.45	0.065	1.54	3.85	3.87	OK
90	132.0	110	2628	0.03	2.96	2.94	44.11	0.067	1.52	4.48	4.51	OK
100	146.7	110	2628	0.03	3.31	3.07	48.40	0.068	1.50	4.96	4.99	OK
110	161.3	110	2628	0.04	3.66	3.21	52.63	0.069	1.49	5.44	5.47	OK

(Note: Wave run-up calculated for embankment with 1:3 Slope)

**Using...**

1:3 Slope	
Ho/Lo	R/Ho
0.040	1.900
0.050	1.740
0.060	1.600
0.070	1.480
0.080	1.370

**Table 1:**

1:2 Slope	
Ho/Lo	R/Ho
0.040	2.280
0.050	2.200
0.060	2.140
0.070	2.060
0.080	2.000

**Table 2:**

1:2.5 Slope	
Ho/Lo	R/Ho
0.040	2.110
0.050	1.950
0.060	1.820
0.070	1.740
0.080	1.630

**Table 3:**

1:3 Slope	
Ho/Lo	R/Ho
0.040	1.900
0.050	1.740
0.060	1.600
0.070	1.480
0.080	1.370

**User Defined:**

1:x Slope	
Ho/Lo	R/Ho
0.050	2.200
0.060	2.140
0.070	2.060
0.080	2.000
0.090	1.920

**INPUT**

**Project :** Tarmac Levy County Mine  
**Site:** Pit 9

**Bottom EI** -100      **Water EI** 10  
**Critical EI** 19      **Fetch:** 2628

**Use Table (1, 2, 3, or X for User Defined) :** 3

on adjacent shores. If adverse effects are predicted, comprehensive planning for remedial measures should be considered in the overall plan.

#### ACKNOWLEDGMENTS

Many of the data summarized herein were taken from United States Army Corps of Engineers reports, and from reports prepared by individuals and published by technical societies. The approval of the Office of the Chief of Engineers to publish this paper is greatly appreciated.

Kiteck

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## AMERICAN SOCIETY OF CIVIL ENGINEERS

Founded November 5, 1852

### TRANSACTIONS

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Paper No. 3465  
(Vol. 128, 1963, Part IV)

#### FREEBOARD ALLOWANCES FOR WAVES IN INLAND RESERVOIRS

By Thorndike Saville, Jr.,<sup>1</sup> M. ASCE, Elmo W. McClendon,<sup>2</sup> and  
Albert L. Cochran,<sup>3</sup> F. ASCE

#### SYNOPSIS

Several considerations that should enter into the selection of freeboard allowances for wind-generated waves in large inland reservoirs are reviewed herein. Certain research studies conducted by the Corps of Engineers to establish more rational procedures and generalized relationships for estimating the characteristics of wind-waves generated in inland reservoirs are summarized. A brief outline of wind-tide relations as associated with inland reservoirs is included. Hydraulic model studies and related analyses that are relevant to the development of practical relationships in estimating run-up on embankments and overtopping of embankments having various physical characteristics are also examined. Finally, sample computations are presented to illustrate applications of the generalized relationships described.

#### INLAND RESERVOIRS

Artificial reservoirs are characteristically deepest near the dam site, gradually decreasing in depth in an upstream direction. Shorelines are ir-

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Note.—Published essentially as printed here in May 1962 in the Journal of the Waterways and Harbors Division as Proceedings Paper 3138. Positions and titles given are those in effect when the paper was approved for publication in Transactions.

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Wave Run-up

regular in configuration, open areas of water are comparatively long and narrow, and adjacent terrain is often rugged in character and covered by forests to varying degrees. Some areas of an inland reservoir may be comparatively shallow, but connections with deep portions of the reservoir result in conditions affecting the generation of waves and wind tides (wind set-ups) that are somewhat different from those prevailing in generally shallow lakes.

The relationships between surface winds and waves produced in deep inland reservoirs are basically the same as those applicable to shallow lakes or ocean waters, but the influences of those physical features cited require evaluation of the wave and wind-tide characteristics associated with reservoirs. Such evaluations are executed by use of somewhat different generalized relationships than those generally applied to large shallow inland lakes, or those used in forecasting ocean waves. Of particular significance are the effects of the terrain on wind velocities near water surfaces, and the difficulties involved in measuring or predicting these velocities accurately. Winds over ocean surfaces are governed largely by meteorological influences that may be reflected in large-area synoptic "isovel patterns" representing wind velocities and directions that are consistent with observed or forecast pressure distributions prevailing at successive time intervals. Similar isovel patterns may be developed in analyzing waves and wind-tides in large natural inland lakes, such as Lake Okeechobee, Florida. Rational adjustments for effects of surrounding terrain may also be derived through such analyses. In contrast, the surrounding terrain and the highly irregular configuration of the inland reservoir areas tend to increase turbulence and confuse directional patterns at water surfaces, to reduce average surface wind velocities, and otherwise to result in a more variable relationship between general wind patterns and wave and wind-tide characteristics. Moreover, the irregular shorelines of artificial reservoirs cause diverse refraction effects that alter the characteristics of the waves generated by winds. For these and other reasons, the determination of generalized relationships between winds and wave characteristics in inland reservoirs is substantially dependent on empirical observations. However, the margin of error in estimates may be reduced through rational analyses of the relationships between wind and wave characteristics in inland reservoirs.

#### FREEBOARD

The most common requirement for estimating wave characteristics relates to the determination of "freeboard allowances" that are to be considered in establishing design elevations for dams, auxiliary dikes, highway and railroad embankments that cross the reservoir, riprap or paving of embankment slopes, boat docks, or other structures within the reservoir limits. These freeboard allowances are of major economic significance, often representing investments of millions of dollars on large projects.

In nautical parlance, the term "freeboard" refers to the distance between the water line and the deck of a boat. With respect to reservoir problems, this is generally applicable if the "freeboard reference elevation" is specifically designated. In some cases, the freeboard on a dam has been referred to as the vertical distance from the normal operating pool level to the top of the

dam, whereas in other cases freeboard has been measured from the maximum elevation that may be attained by the spillway design flood to the top of the dam. In all cases, the freeboard reference elevation applies to the water level that would theoretically exist if there were no wave action. With respect to highway and railroad embankments, boat docks, and similar structures, it is normal practice to reference freeboard to the normal operating reservoir level. However, it is apparent that freeboard could be referenced to any pool elevation, and that in design studies it is important to specify the reference level that is considered to be most logical in the particular case.

From a practical standpoint, freeboard allowance requirements cannot be properly estimated without giving consideration to the slope of the embankment or structure involved, the roughness of the surface on which waves will impinge, the resistance of the embankment surface to erosion, and other physical features that influence wave run-up. Data that will be presented subsequently will show that run-up on a smooth embankment having a slope of approximately 1 on 10 may be several feet lower than run-up on a smooth surface having a slope of 1 on 3. If coarse riprap were provided on the embankment face, the total height of run-up on either slope would be less, and the differential would be smaller. Accordingly, the wind-wave relationships examined herein should be considered in connection with the selection of embankment slopes and surface treatment to assure the development of the most economical and generally satisfactory project design; that is, freeboard should never be considered as something that is added to a structure after it has been otherwise designed.

Factors governing freeboard estimates that are associated with wind-generated waves and wind tides include the following:

1. Height of wind tide above the water level adopted as the freeboard reference elevation;
2. wave characteristics, particularly wave heights and lengths;
3. height of wave run-up on the slope, and quantities of overtopping (if any) to be expected from waves corresponding to the estimated characteristics; and
4. resistance of embankments and structures to damage from wave action and overtopping (if any), considering acceptable maintenance charges.

In preparing freeboard estimates pertaining to a particular reservoir project, the following basic steps are involved:

1. Key locations are selected for the computation of wave characteristics that are pertinent to the analysis of freeboard requirements. These locations should be such as to provide the information necessary to meet specific design objectives, or suitable for interpolation of requirements applicable to intermediate points. As a general rule, these intermediate points will include locations on the embankment of the main section of the dam, so situated as to correspond to the maximum effective fetch; locations on highway or railroad embankments where freeboard requirements will govern the establishment of grade elevations; and other points of major interest from a design standpoint.
2. Initial pool levels to be adopted as freeboard reference elevations are selected. Reservoir regulation studies will be required to determine appropriate reference levels.

3. Wave characteristics and wind-tide effects located near the toe of the embankments (corresponding to selected wind velocity and direction criteria) are computed.

4. Wave run-up and overtopping quantities that affect the embankments under study, including consideration of pertinent alternative slopes, surface roughness, grade elevations, and other factors, are computed.

5. Final freeboard allowances are adopted after collective consideration of the factors influencing the determinations, including economics and relative risks.

#### FIELD OBSERVATION PROGRAMS

Field observations of coincident wind velocities and directions, wave heights and periods, and sustained water levels at key locations in Lake Texoma, located near Denison, Texas, and Fort Peck Reservoir, in Montana, were made by the Corps of Engineers<sup>4</sup> for protracted periods during 1950 and 1953. Some wind observation stations were located on towers in the lake, and others on shore, in order to provide indexes of wind velocities affecting fetches corresponding to the respective wave measuring stations. Insofar as practicable, wind velocities at lake stations were measured at approximately 30 ft above the water surfaces, depending on reservoir level fluctuations. These stations also provided data for use in estimating the average relationships of "over-water" wind velocities to corresponding "over-land" velocities. Wave-measuring and water-level gages were located where maximum waves were expected. Details of the installations are summarized subsequently.

#### FORT PECK RESERVOIR WAVE STUDIES

From the 250-ft high earthen dam in eastern Montana, the Fort Peck Reservoir twists and turns southwest up the old river valley, a distance of approximately 189 miles. In its lower portion the reservoir has an average width of from 3 miles to 4 miles, but contains a multitude of smaller bays and inlets that serve to increase its maximum width to approximately 16 miles at a point immediately above the dam. Wave studies in this reservoir were initiated in 1949 with the construction of two wind and wave measuring stations. Station I, approximately 5 miles upstream from the dam, was exposed to open-water fetches of several miles, in the sector from ENE through SSW. The shore area near the station consists of treeless, grass-covered rolling uplands with an elevation a few hundred feet higher than the reservoir pool. Station II, 13 miles upstream from the dam and 8 miles SSW of Station I, was located near the head of the fetch to Station I under SSW wind conditions. The shore area near Station II was rolling grassland, with scattered pine trees. Each station was placed approximately 1,000 ft from the shore with the final locations based on echo-depth-recorder mapping of adjacent areas. In addi-

<sup>4</sup> "Waves in Inland Reservoirs," Summary Report on Civ. Works Investigations Projs. CW-164 and CW-165, Beach Erosion Bd., Corps of Engrs., U. S. Dept. of the Army, Washington, D. C. (to be published).

tion to these two lake stations, a wind recorder was operated at the Fort Peck townsite (located just downstream of the left abutment of the dam) during the entire study period.

The support for each instrument shelter in the reservoir consisted of a single 28-in. OD dredge pipe that was pile driven 20 ft to 25 ft into the reservoir bottom. A cylindrical sheet metal building, 6 ft high at the eaves and 6.5 ft in diameter, was bolted to the top of the pile, housing all the measuring and recording equipment. The ground elevation at the base of each of the two structures was 2,180 ft mean sea level (msl), which was sufficient to assure that true deep-water waves would be present for all feasible pool elevations. In the fall of 1949, the dredge pipe piles were cut off at an elevation of 2,200 ft msl by a diver with an underwater torch, and the structures were removed to prevent ice damage. During the winter, a slip-over sleeve connection was welded to the bottom of the pipes that were removed, thereby facilitating the installation and removal of the structure during the three following open-water seasons.

The wind and wave measuring and recording equipment was designed and constructed by the Beach Erosion Board (BEB) and the Washington District, Corps of Engineers. The principal components of the complete installation consisted of a step-resistance type wave staff (with a DC power source provided by dry-cell batteries); an oscillograph to record current fluctuations in the wave staff circuit; a wind vane and anemometer recording on an operation recorder; heavy duty 6-volt wet-cell batteries to operate the recording apparatus; a DC generator for recharging the storage battery; and a supply of 110-volt, 60-cycle AC power (by means of an inverter) to operate the oscillograph. This equipment provided a correlated record of wind velocity, wind direction, and wave height for unattended periods to 7 days. Wave recordings were taken on a 1-min-out-of-10-min (or 1-min-out-of-5-min) basis, whereas the wind recorder operated continuously.

#### LAKE TEXOMA WAVE STUDIES

Lake Texoma, formed by Denison Dam, is located on the Red River, 726 miles upstream from the mouth where it forms the boundary between south-central Oklahoma and north-central Texas. The reservoir shore line is irregular and, in general, is covered with trees down to an elevation of approximately 620-ft msl, some 3 ft above the top of the power pool. The reservoir is approximately 2 miles to 3 miles wide immediately above the dam, but widens to more than double this value at the junction of the Red and Washita arms of the reservoir. Gently rising slopes and low rolling hills are the predominant characteristics of the shore areas near the wave stations. Three wind and wave stations were located in the reservoir, as shown in Fig. 1 and described subsequently.

*Station A.*—The location of the structure was approximately 1-mile upstream from the dam and approximately 200 ft from the right-bank shoreline at an elevation of 617 ft msl. The structure supporting the 6 ft by 6 ft by 6 ft steel shelter, in which the wind and wave recorders were housed, consisted of a 30-ft prefabricated galvanized steel tower mounted on wood piling that was driven into the reservoir bottom at a point where bottom elevations were 590 ft msl. The reservoir deepens sufficiently rapidly in the direction of the

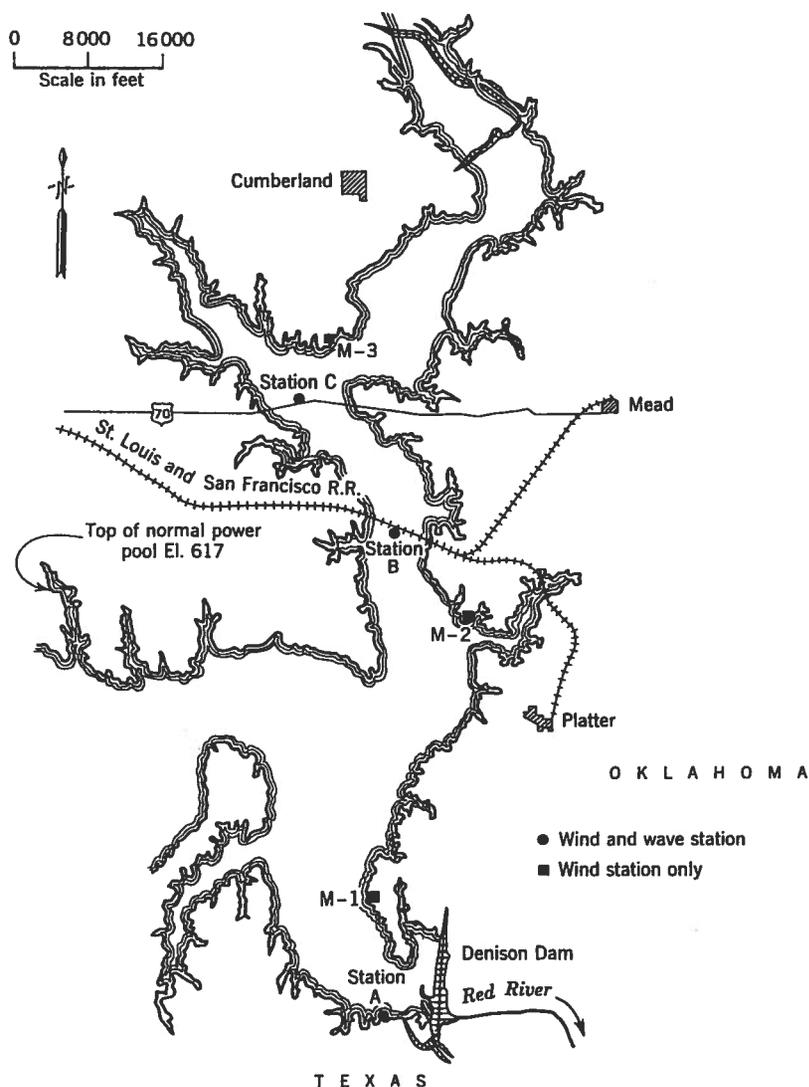


FIG. 1.—LOCATION MAP, DENISON RESERVOIR

principal fetch area to represent deep-water wave conditions. The power supply for operating Station A was 110-volt AC. The station was exposed to north-northwesterly, open-water fetches approximately 7 miles long, but widths are restrictive, as indicated in Fig. 1. In general, water depths along this fetch exceeded 50 ft to 60 ft.

*Station B.*—The wave gage at Station B was located on the downstream side of the St. Louis and San Francisco Railway Bridge crossing the Washita area of the reservoir, approximately 10 miles upstream from the dam and 3 miles above the head of the northerly fetch to Station A. The wind instruments and the wind and wave recorders were located in a shelter on the right-bank abutment of the bridge and were connected to the wave gage by 400 ft of underwater cable. The power supply for Station B was 110-volt AC. At normal pool levels this station was exposed to southerly open-water fetches approximately 7 miles in length. During periods of extreme drawdown of the reservoir, waves from the south that traversed a shallow area some 2 miles to 3 miles SSE of the station were altered in their characteristics to the extent that they could not be considered true deep-water waves. These periods were omitted from the wave analyses pertaining to the development of deep-water wave relations.

*Station C.*—The wave gage at Station C was located on the north side of the bridge crossing of Highway 70 at the Washita arm of the reservoir, approximately 500 ft from the left bank of the reservoir. The wind and wave recorders were housed in a shelter on the side of the bridge. The power supply for this station was furnished by batteries from August, 1950, to October, 1952, when 110-volt AC power was supplied to the station for operations from that time until October, 1954. Station C was exposed to open-water fetches (restricted in width) from up to 5 miles from the northwest. To the north and northeast, an under-water ridge affected the wave characteristics approaching this station; therefore, waves from this general direction were not used in the analyses.

*M-1, M-2, and M-3 Stations.*—In addition to the three wind and wave stations located on the reservoir, three wind stations (M-1, M-2, and M-3) constructed at on-shore locations along the left bank of the reservoir from approximately 2 miles upstream from the dam to 2 miles north of Station C. Locations are shown in Fig. 1. Stations M-1 and M-2 were mounted on 30-ft prefabricated steel towers; Station M-3 was placed on an oil derrick. The Esterline-Angus recorders that were connected to the Robinson 3-cup anemometers and wind vanes were powered by wet-cell storage batteries.

Operation experiences at Denison emphasized the desirability of using 110-volt AC current from commercial power sources in lieu of batteries, where possible, and the desirability of housing recorders on shore. Recorder failures at Denison were most prevalent during hot summer days—apparently the result of instrument shelter temperatures being higher than outside temperatures.

#### LAKE OKEECHOBEE WAVE AND WIND TIDE STUDIES

The Jacksonville District of the Corps of Engineers, in cooperation with the Office of the Chief of Engineers and the BEB, has also conducted an extensive program to study the effect of shallow depths on the characteristics

of waves and wind set-up that are generated in an enclosed body of water.<sup>5</sup> It has long been known that depth of water will materially affect these characteristics. In connection with the determination of methods for the computation of these characteristics in predominantly shallow waters, extensive observations and analyses of waves and wind set-up in Lake Okeechobee, Fla., have been conducted since 1948. Lake Okeechobee is a large shallow body of fresh water in southern Florida. Nearly circular in form, it has a surface area of 730 sq miles and an average diameter of 31 miles. The bottom is saucer shaped, with the greatest depth of approximately 14 ft being near its center. During severe hurricanes, strong sustained winds, exceeding 80 mph for a few hours, have caused the water level to reach 10 ft or more above normal at either end of the lake, while the level was depressed to considerably below normal at the other end. Maximum wave heights ranging from 6 ft to 9 ft have been measured in the lake; however, wave heights are limited by the shallow depths prevailing. Analyses of these data have been summarized by E. W. Eden, Jr.,<sup>6</sup> F. ASCE, L. A. Farrer,<sup>7</sup> M. ASCE, and Ira A. Hunt, Jr.,<sup>8</sup> M. ASCE. The methods presented include detailed step-integration procedures for irregular bottom conditions under which large wind-tide effects are anticipated and the need for accurate estimates justifies the efforts required to prepare detailed computations.

#### LAKE McNARY WAVE STUDIES

The Walla Walla District of the Corps of Engineers currently has underway a program of wind and wave investigations related to the planned John Day Reservoir on the Columbia River. These studies involve certain complexities caused by the winding river, the steep, high banks associated with the river, and the narrowness of the final reservoir.

Four wind and wave gage stations have been installed in Lake McNary, as have a large number of wind stations both on Lake McNary and in the John Day area. Data are being obtained from these instruments by the Walla Walla District, and later analyses of these data may be expected to provide the information needed to assure more accurate determinations of wave and wind-tide effects that influence various project features.

#### RECENT DEVELOPMENTS IN EQUIPMENT AND TECHNIQUES APPLICABLE TO THE MEASUREMENT OF WINDS AND WAVES

During and subsequent to these field measurement programs, several improvements in the instrumentation have been developed leading to simpler and

<sup>5</sup> "Waves and Wind Tides in Shallow Lakes and Reservoirs," Summary Report, U. S. Army Engr. Dist., Jacksonville, Fla., 1955.

<sup>6</sup> "Hydrology and Hydraulic Problems as Related to Design of Project Works," by E. W. Eden, Jr., *Proceedings*, 20th Annual Meeting, Soil and Crop Science Soc. of Fla., 1960.

<sup>7</sup> "Wind Tides on Lake Okeechobee," by L. A. Farrer, *Proceedings*, 6th Conf. on Coastal Engrg., Council on Wave Research, Engrg. Foundation, 1958.

<sup>8</sup> "The Effect of Wind on Liquids," by Ira A. Hunt, Jr., thesis presented to the University of Grenoble, at Grenoble, France, in 1954.

less expensive field operations. Many of these improvements are incorporated in the program that is now (1962) being conducted on the Columbia River, by the Walla Walla District. For example, the wave gages being used are still of the step-resistance type, utilizing a series of precision resistors with resistance values carefully computed to provide a linear calibration for wave recordings on oscillograph charts. However, these new gages are made of plastic, poured in a mold surrounding the resistors, and allowed to harden. The gages are now made in 5-ft sections, with a standard gage usually composed of either two or four sections. These plastic sections slide into a prefabricated metal mount to form a gage of the overall length required. The step contacts to the water surface may be constructed at 1/10-ft to 2/10-ft intervals. These gages are considerably more accurate, lighter, less cumbersome, less expensive, and easier to maintain than the previous gages.

A programming device has been developed for use with the gages being used in the Walla Walla District's investigations. This device would permit the selection of the recording periods depending on the actual wave height, although none of these devices has yet been installed. This programmer would provide for normal recording during periods of low waves, and for an additional recording of approximately 10 min when waves exceed any particular pre-set height. Additional recordings would also be obtained when the wave height exceeds pre-set higher heights. The device would automatically readjust to normal recording after making the additional recordings. However, if higher waves are present during an ordinary recording period, no additional records would be made. This new type of programmer would be advantageous in giving additional information on the higher waves, and particularly advantageous in providing information on high waves that might occur between normal periods of recording without accumulating useless records during periods when waves are smaller than needed for the study.

A magnetic tape recorder has been developed that provides wave records that may be analyzed electronically to obtain a spectrum analysis. Previously, spectrum analyses could only be obtained from the paper pen-and-ink record by the tedious process of reading a large number of successive ordinates at small time increments, and either performing a time-consuming numerical analysis, or placing this data on punch tape or punch cards for use in a large computer.

*Notation.*—The letter symbols adopted for use in this paper are defined where they first appear and are arranged alphabetically in the Appendix.

#### NOTATION AND TERMINOLOGY

Fetch,  $F$ , is the continuous area of water over which the wind blows in an essentially constant direction (sometimes used synonymously with fetch length); it is also termed the generating area. Fetch length is the horizontal distance (in the direction of the wind) over which the wind blows. Fetch width is the width of the generating area, or the horizontal distance perpendicular to the wind direction.

Wind velocity,  $U$ , and the direction of the wind considered in the formulas that are presented herein, are assumed to be measured at an elevation of about 25 ft to 30 ft above the water surface. The wind duration,  $t$ , is the length

of time the wind blows in essentially the same direction over the fetch. The minimum duration is the time necessary for steady state wave conditions to develop for a given wind velocity over a given fetch length.

WIND TIDE

When the wind blows over a water surface, it exerts a horizontal stress on the water, driving it in the direction on the wind. This wind effect results in a "piling up" of the water at the leeward end of an enclosed body of water, and a lowering of the water level at the windward end. This effect is called wind tide. Considerable study has been made of wind tide, both in the laboratory and the field.<sup>5,6,7,8,9,10,11</sup> These studies have led to the general acceptance of the formula

$$S = K \frac{V^2 F}{D} N \cos \theta \dots \dots \dots (1)$$

in which S is the wind tide (wind set-up) that may be expressed either as the difference in water-surface elevation at the windward and leeward sides of the lake, or as the height of rise above the stillwater level that would prevail without wind action, depending on the value adopted for the coefficient K, K represents a dimensional constant related to shearstress (Eq. 1) that has been given different values by different investigators; V is the wind velocity; F represents the fetch, or the distance the wind blows over water toward the point under consideration; D is the average depth of the lake along the general fetch area; N represents a planform coefficient, dependent on the configuration and hydrography of the lake (generally about 1); and  $\theta$  denotes the angle between the wind and the fetch.

The formula presented as Eq. 1 was developed originally by Dutch engineers in connection with the Zuider Zee project design, except that any allowances for N were included in the constant K. For most reservoir areas, N may be approximated as 1.0. The value of  $\cos \theta$  may be taken as 1.0 if estimates of average wind velocities are developed to represent wind components along the fetch under consideration.

The rise in the water level at the leeward end of the lake is usually of more importance than the full set-up between the two ends of the lake. If S is expressed in the number of feet above the stillwater elevation that would prevail in the reservoir without wind action, V in mph, and F in statute miles, then a value of K equal to 1/1400 may be accepted as a good average value. This average value is based on the range of K values proposed by various investigators. To conform with this conclusion, and conclusions previously stated, Eq. 1 may be simplified to yield

$$S = \frac{V^2 F}{1400 D} \dots \dots \dots (2)$$

<sup>9</sup> "Wind Effect on Lakes and Rivers," by B. Hellstrom, Royal Swedish Inst. for Engrg. Research, Proceedings, No. 158, Stockholm, Sweden, 1941.

<sup>10</sup> "Wind Tide in Small Closed Channels," by G. H. Keulegan, Research Paper 2207, Journal, Natl. Bur. of Standards, 1951.

<sup>11</sup> "Lake Okeechobee and Outlets," U. S. Army Engr. Dist., Design Memorandum, Supplement 2, Sections 3 and 4, Jacksonville, Fla., 1956.

Step integration methods of applying Eq. 1 and similar formulas are summarized in references cited previously, but these more complicated procedures are generally unnecessary in estimating wind tide in relatively deep reservoirs because of the small values indicated by experience. Water level gages that were installed in Lake Texoma and the Fort Peck Reservoir were used to test this conclusion. Because of reservoir fluctuations, the values of wind set-up that were associated with particular winds were difficult to determine accurately. Nevertheless, careful examination reveals that wind set-ups (even for the highest wind velocities recorded during the test) never ex-

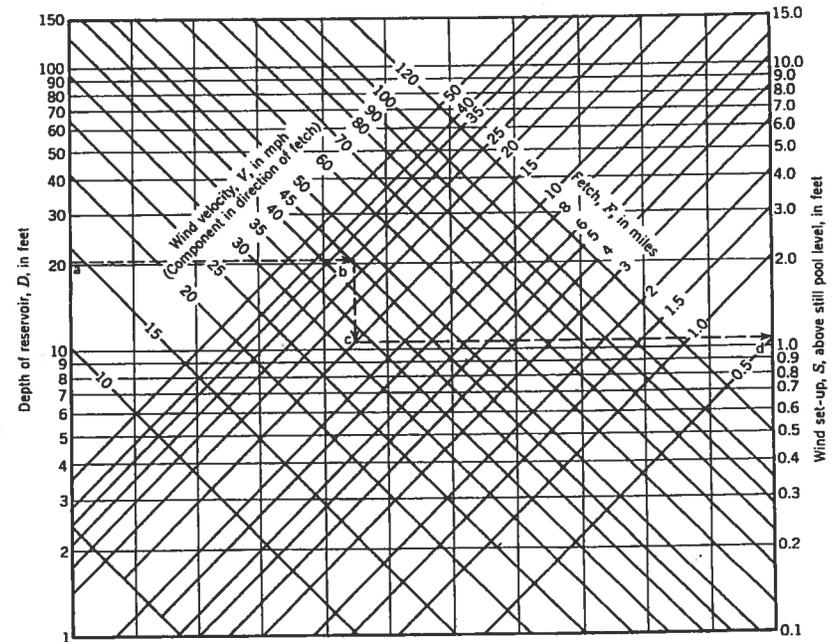


FIG. 2.—DIAGRAM FOR COMPUTATIONS OF WIND SET-UP IN RESERVOIRS

ceeded more than 0.5 ft to 1 ft in the deep reservoirs involved, as would be predicted by use of Eq. 2.

Fig. 2 is a graphical solution of Eq. 2. The value of depth, D, used in the solution should be a reasonable approximation of the average reservoir depth over the fetch distance, F, giving somewhat greater weight to depths within a few miles of the point of interest. The value of F as used in wind set-up computations is frequently taken as substantially longer than the effective fetch used in computing wave characteristics. Wind-tide effects may be transferred, to some extent, around substantial bends in a reservoir, thus warranting the assumption of the existence of a longer fetch than indicated by a clear straight fetch distance. Although the validity of this conclusion has not

been scientifically verified, it is considered reasonable in that more conservative wind-tide estimates are derived for deep reservoirs. Conservative estimates may be preferred because of the approximate nature of the computations involved, and the relatively small wind-tide values that are usually obtained. However, when circumstances yield relatively large wind-tide estimates, the more refined estimates attained by means of the step-integration computations may be advisable. Generally, such refinements in wind-tide computations are warranted only when reservoirs are comparatively shallow (less than approximately 30 ft) and high-wind velocities are anticipated for protracted periods of time.

#### WORKING DIAGRAMS AND PROCEDURES FOR ESTIMATING WAVE CHARACTERISTICS

The Fort Peck and Lake Texoma wave studies were used to develop formulas and a series of curves relating the significant wave height,  $H_s$ , and wave length,  $L$ , to the various parameters on which the determination of wave

TABLE 1.—WAVE HEIGHT DISTRIBUTIONS

Percent of total number of waves in series averaged to compute specific wave height, $H$ (1)	Ratio of specific wave height, $H$ , to average wave height, $H_{ave}$ ( $H/H_{ave}$ ) (2)	Ratio of specific wave height, $H$ , to significant wave height, $H_s$ ( $H/H_s$ ) (3)	Percent of waves exceeding specific wave height, $H$ (4)
1	2.66	1.67	0.4
5	2.24	1.40	2
10	2.03	1.27	4
20	1.80	1.12	8
25	1.71	1.07	10
30	1.64	1.02	12
33-1/3	1.60	1.00	13
40	1.52	0.95	16
50	1.42	0.89	20
75	1.20	0.75	32
100	1.00	0.62	46

characteristics depend. These parameters involve primarily the wind speed, the fetch distance, and the wind duration. However, these parameters are dependent on other conditions peculiar to the particular area. For example, where the fetch area is relatively narrow in relation to its length, the effective fetch length is not the actual distance over which the wind blows but a distance somewhat less than this as affected by the relative width of the fetch. Such a dependence had not been previously evaluated, inasmuch as the majority of the available data were for ocean areas where the fetch width is too large to materially affect the waves. Similarly, as noted previously, the wind velocities over reservoir areas are modified by surrounding terrain and vegetation.

As used herein,  $H$  and  $L$  are expressed in feet,  $F$  in statute miles, and  $U$  in statute miles per hour.

*Wave Spectrum.*—Wind-generated waves in a large body of water are not uniform in height, but consist of spectrums of waves ranging in height. By averaging a number of the highest waves occurring in continuous sequences and corresponding to near steady-state conditions, the elevations tabulated in Table 1 have been established. These elevations agree closely with observations at the Fort Peck and Denison Reservoirs.

Under natural conditions, successive waves reaching any particular point during a short time interval will not be identical. That is, in general, each wave will be preceded and succeeded by either a higher or a lower wave, and a wave of somewhat different period. Data obtained from the Ft. Peck-Denison recordings were analyzed to determine the frequency distribution. These data were obtained from twenty storm periods from the Ft. Peck data, and twenty-five storm periods from the Denison data. These periods were selected arbitrarily to give a wide range of wind and fetch conditions in order that both wind and fetch were relatively constant for a long period of time. At least 100 waves were analyzed for each recording period to assure statistical significance. The recorder operated 1 min out of every 5 or 10 min; therefore, to obtain the minimum number of one hundred waves, it was necessary to group three or four consecutive recordings and analyze these as a single sample. That is, perhaps thirty waves were taken from the first 1-min record, thirty waves from the second, and so on, with 5 min or 10 min intervening between the 1-min samples. The individual heights from each of these 45 records were determined and plotted (as ratios of actual height to significant height) on frequency diagrams. The scatter of the individual curves was not great, particularly when the method of sampling (that is, use of several continuous records) is considered.

The average frequency curve for these samples (as shown in Fig. 3) is compared with the frequency distributions for ocean waves derived by R. R. Putz<sup>12</sup> and M. S. Longuet-Higgins.<sup>13</sup> The points obtained from the reservoir data correspond closely with these curves, and it is felt that these distributions may be applied equally as well to reservoir waves as to ocean waves.

In addition, an extensive record from Fort Peck, involving 2,000 successive waves, was similarly analyzed—the points from this data also corresponding closely with the curve (see Fig. 3). The values given by the curve (Fig. 3) may be used to determine the occurrence frequency of a wave of any height,  $H$ , in an inland reservoir, once the significant wave height,  $H_s$ , has been established (see Fig. 4).

The same curve may be used to establish the design height for waves when the significant height is not adequate. For example, the freeboard of earth dams may be designed on the basis of the wave, that is exceeded only 1% or 2% of the time rather than on the basis of the significant wave height, which is exceeded about 13% of the time. Theoretical values of the more commonly used heights are tabulated in Table 1.

<sup>12</sup> "Statistical Distribution for Ocean Waves," by R. R. Putz, *Transactions*, Amer. Geophysical Union, Vol. 33, No. 5, 1952.

<sup>13</sup> "On the Statistical Distribution of the Heights of Sea Waves," by M. S. Longuet-Higgins, *Journal of Marine Research*, Vol. XI, No. 3, 1952.

*Analysis of Data.*—The data available for analysis consisted of recordings of waves and still-water elevations at a total of five stations in the Fort Peck and Denison Reservoirs, and continuous wind velocity and direction recordings at these five stations and at four additional locations on land adjacent to the reservoirs. Thus, the wave records furnished frequent samples (though of short duration) of wave heights and wave periods at specific locations. No

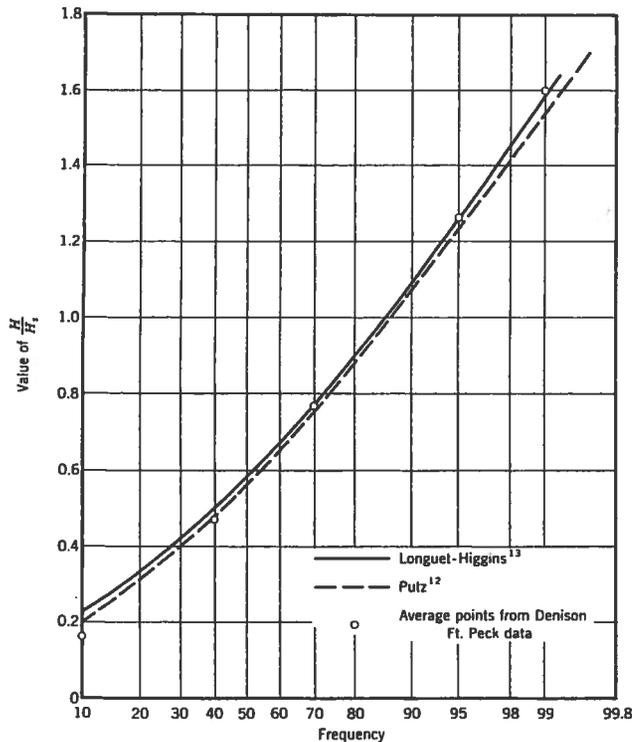


FIG. 3.—FREQUENCY DISTRIBUTION OF WAVE HEIGHT WITHIN ANY PARTICULAR WAVE TRAIN

actual measurements of associated wave lengths were attempted because it was assumed that the wave length could be determined from the wave period. At the Fort Peck stations, only those windstorms that generated waves in excess of 2 ft were considered worthy of detailed analysis. At the Denison stations, only those wind periods having velocities in excess of 20 mph were analyzed in detail.

Because of the prominence of the Sverdrup-Munk relations,<sup>14</sup> and the revisions of Charles L. Bretschneider,<sup>15</sup> M. ASCE, and the fact that the Fort Peck and Denison measurements appeared to lend themselves readily to a study of the applicability of the theory, these relations were tested by applying the observed data from the two reservoirs. The testing was accomplished by utilizing dimensionless plots (see Figs. 5 and 6) relating significant wave heights,  $H_s$ , and wave periods,  $T_s$ , to wind velocity,  $U$ , wind duration,  $t$ , and fetch distances,  $F$ . The values of  $F$ ,  $U$ , and  $t$  are determined by the characteristics of the reservoir under consideration, particularly its depth, configuration, and surrounding topography and vegetation. Therefore, the first step involved in the determination of the dimensionless parameters  $gT_s/U$ ,  $gH_s/U^2$ ,

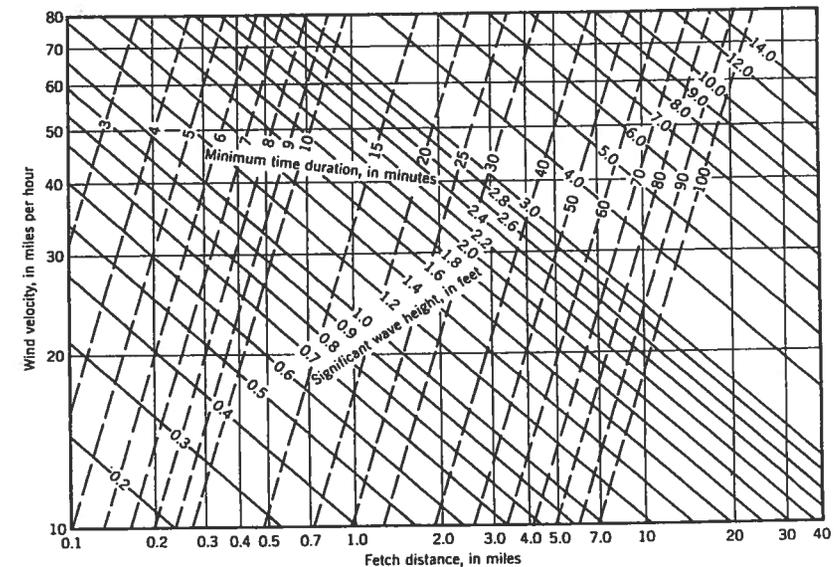


FIG. 4.—WAVE HEIGHTS AND MINIMUM WIND DURATIONS (MULTIPLY "MINIMUM TIME DURATION, IN MINUTES" BY 1.37)

and  $gF/U^2$  (from the Fort Peck and Denison wind and wave records) involved the determination of  $F$ , the effective fetch length.

*Effective Fetch Length.*—In the early phases of the analysis of the wind and wave records, fetch distances to each wave station were selected as being the greatest straight line distance over open water in the direction of the

<sup>14</sup> "Wind, Sea, and Swell: Theory of Relations for Forecasting," by H. U. Sverdrup and W. H. Munk, Publication No. 601, U. S. Navy Hydrographic Office, 1947.

<sup>15</sup> "Revised Wave Forecasting Relationships," by Charles L. Bretschneider, *Proceedings*, 2nd Conf. on Coastal Engrg., Council on Wave Research, Engrg. Foundation, 1952.

wind. It soon became apparent that according to existing relationships, the measured waves were too low for the indicated fetches at those stations where the width of the fetch was small in comparison with the length. It was also noted that wind velocities over short fetches, at angles to 30° to 45° to the longer fetches, produced higher waves than could be expected over the short fetch measured in the direction from which the wind was blowing. These con-

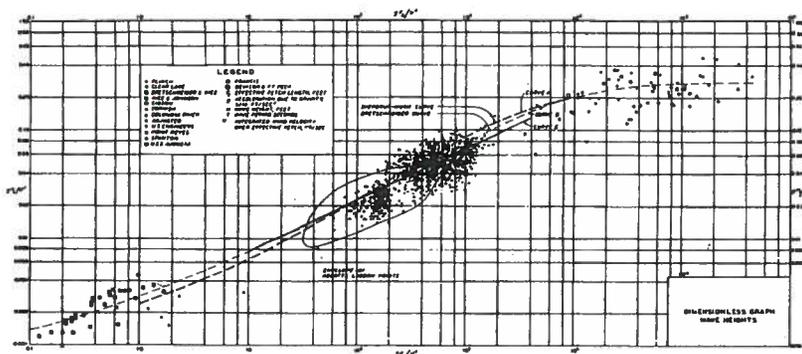


FIG. 5.—DIMENSIONLESS GRAPH, WAVE HEIGHTS

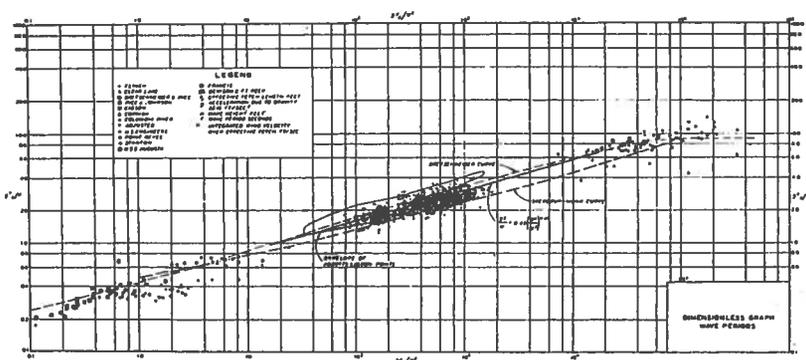


FIG. 6.—DIMENSIONLESS GRAPH, WAVE PERIODS

siderations led to the development of a method for computing effective fetch lengths for an inland body of water. The method appeared to give reasonable and comparable results for the many and varied fetches of the Fort Peck and Denison wave stations. The method developed<sup>16</sup> was based on the concept that

<sup>16</sup> "The Effect of Fetch Width on Wave Generation," by Thorndike Saville, Jr., *Tech. Memorandum No. 70*, Beach Erosion Bd., Corps of Engrs., U. S. Dept. of the Army, 1954.

the width of a fetch in reservoirs normally places a definite restriction on the length of the effective fetch; the less the width-to-length ratio, the shorter the effective fetch. After testing several other methods, the procedure for determining the effective fetch distance, as illustrated on Fig. 7, was developed and adopted.

Basically, this procedure assumes that the effectiveness of any segment in the fetch is indicated by the ratio of the actual length of the segment to the length it would be in a fetch of unrestricted width. This ratio is the same as that of the projection of these lengths on the central radial. It is further assumed that the effectiveness of the wind in generating waves (that is, in exerting its stress on the water surface) is proportional to the cosine of the angle from the average wind direction. Then, the total effectiveness of each fetch segment is proportional to the product of these two values. Total effectiveness of the entire fetch may be considered as the sum of these products divided by the sum of the cosines (or the wind effectiveness). For the particular case shown in Fig. 7, fifteen radials were constructed on the reservoir contour map at intervals of 6°, oriented so that the vertex of all radials was located at Station A with the central radial in the direction of the wind. These fifteen radials, each representing the mean for a 6° sector, thus cover a sector of 45° on either side of the central radial. Each radial is extended so that it runs the full length of the water surface at a given pool elevation. In accordance with the foregoing assumptions, the method for computing the effective fetch is developed in the following steps:

1. Tabulate the effective length of each of the 15 radials. Effective length is represented for each radial by the component of its length measured in a direction parallel to the central radial (Col. 3, Fig. 7).

2. Multiply the effective length of each radial by the cosine of the angle between the central radial and the radial under consideration (the central radial is 0°) and tabulate the results (Col. 4, Fig. 7).

3. Add the fifteen products tabulated in Col. 4 (resulting in 155.46 measurement units for Station A, Fig. 7).

4. Divide this sum by the sum of the cosines,  $\frac{155.46}{13.512} = 11.51$  units for Denison Station A.

5. Convert the quotient obtained in step 4 to miles by applying the proper map scale. The result is the effective fetch in miles  $\left[ \frac{11.51}{3.08} = 3.7 \text{ miles for Denison Station A} \right]$ . This effective fetch is then 3.7 miles (11.5 units) as opposed to a straight-line distance of 8.0 miles (24.7 units).

For each period of high winds or waves that was studied at Fort Peck and Denison, effective-fetch distances were computed by this procedure and subsequently used to determine the dimensionless parameters plotted on Figs. 5 and 6.

Actually, in using this method, radials have been used only over the sector 45° on either side of the central radial, thus assuming the wind to be completely non-effective beyond this area. This assumption results partly from certain theoretical considerations of sheltering, and partly because this assumption corresponds more fully with the data than previously used ocean data.

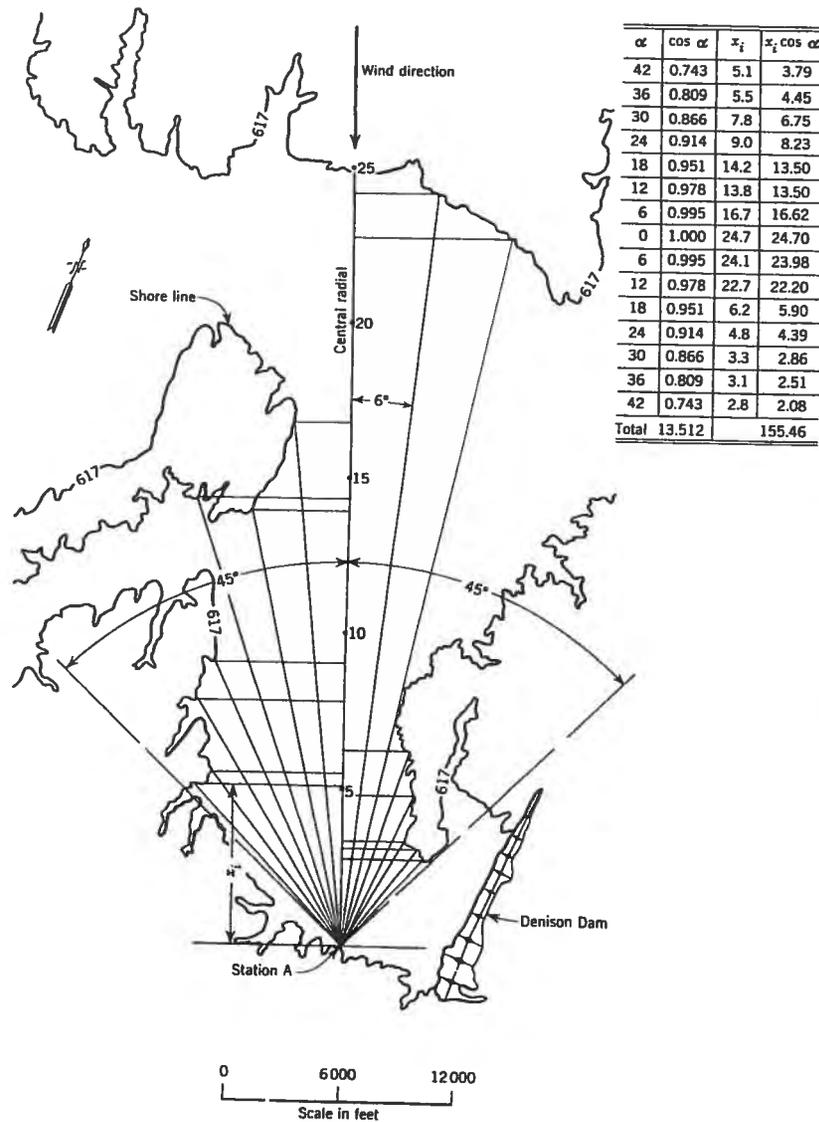


FIG. 7.—COMPUTATION OF EFFECTIVE FETCH, STATION A, DENISON RESERVOIR

*Wind Velocity-Duration Relations.*—Bretschneider's revisions<sup>15</sup> of the Sverdrup-Munk relation for minimum-time-duration were applied (with the approximate fetch and wind velocity) to determine the approximate period of time over which wind velocity measurements should be averaged in order to obtain the effective wind at the wave station. The length of the averaging period was not critical in most cases, because the observed wind velocities and directions were comparatively constant over a several-hour period, during the windstorms that were selected for analysis. The minimum-time-duration was always less than 100 min.

In general, the wind measurements used in the analyses at Fort Peck and Denison were taken at an elevation of approximately 25 ft to 30 ft above the water surface at the wave-recording stations at the end of each fetch. The measured wind velocities at each station were considered to represent indexes of the winds over the fetch to the station, but not necessarily to represent the winds that were effective in generating the waves observed at the end of the fetch. Before the Sverdrup-Munk and Bretschneider curves could be tested, two adjustments in the measured wind velocities were required: The first was the computation of average wind velocities at the respective wave stations for a period of time approximately equivalent to the minimum-time-duration; and the second was an allowance for the increase in wind velocities as the wind leaves the land area and traverses open water to the wind and wave recorder stations. These two adjustments resulted in obtaining an "integrated wind velocity,"  $U$ , that was used throughout the study as the wind causing the measured waves.

For a given atmospheric pressure gradient and meteorological conditions, wind velocities over water,  $U_{\text{water}}$ , are higher than those over land,  $U_{\text{land}}$ , as has been demonstrated in wind studies of hurricanes passing over Lake Okechobee. The magnitude of this differential is a function of the roughness of the land surrounding a reservoir, and possibly of the wind velocity. The wind measurements used herein were obtained over water at the down-wind end of the fetch; thus the measurements were higher than average over the fetch, and some reduction in these values was necessary to obtain a realistic estimate of the wind causing the observed waves. Comparison of concurrent wind velocities at Denison Station C with those at station M-3 during wind storms from the northerly sector, and studies of Fort Peck winds at Stations II, III, and the fire station, have resulted in correction values that may be used to obtain the ratio of over-water wind to over-land wind as a function of fetch distance (Table 2). Although single ratios are shown in Table 2, there was considerable scatter in the actual points used to obtain these ratios. The values tabulated were obtained from the median values (that is, 50% of the observed data lie below these values and 50% above). Although these values represent a reasonable approximation of the land-to-water wind variation for the two reservoirs under consideration, a more detailed investigation of this problem is advisable, particularly where relatively small reservoirs are involved.

*Significant Wave Periods and Wave Heights.*—As determined from the Fort Peck and Denison records, the significant wave period,  $T_s$ , represented the average interval, in seconds, between successive crests or troughs of groups of the higher waves. The significant wave height,  $H_s$ , represented the average wave height, in feet, of the highest one-third of the waves present in each sampling interval. The number of waves to be averaged was determined by

dividing the length of the sampling interval, in seconds, by  $T_s$ . This wave number was then divided by three to obtain the number of waves to be averaged to determine  $H_s$ .

*Dimensionless Plots.*—The Fort Peck and Denison wave data for selected periods of strong winds or high waves were used to determine values of  $T_s$ ,  $U$ ,  $H_s$ , and  $F$  for each one-minute sampling interval during these selected periods. The dimensionless parameters  $gT/U$ ,  $gH/U^2$ , and  $gF/U^2$  were computed for each sample and plotted on Figs. 5 and 6, along with data available from other sources and with the curves determined by Sverdrup-Munk<sup>14</sup> and modified by Bretschneider.<sup>15</sup> Each point shown (Figs 5 and 6) represents the significant wave height (or significant wave period) from a one-minute sample as related to the integrated wind velocity and effective fetch that was determined for the preceding interval of time equivalent to the minimum-time-duration. There are many cases of over-plotting on Figs. 6 and 7 with individual points often representing a multitude of observations.

The approximate "best-fit" curves for significant wave height and significant wave period were drawn through the plotted points. This "mean" curve is directly comparable to the Sverdrup-Munk and Bretschneider curves,<sup>14,15</sup> inasmuch as those curves were also intended to represent the mean conditions for  $H_s$  and  $T_s$ . As shown on Fig. 5, the Bretschneider revision of the Sverdrup-

TABLE 2.—WIND RELATIONSHIP—LAND TO WATER

Fetch, in miles	0.5	1	2	4	6	8
Wind Ratio $\frac{U_{water}}{U_{land}}$	1.08	1.13	1.21	1.28	1.31	1.31

Munk dimensionless curve involving wave height resulted in a flatter slope, with little change in the region where  $gF/U^2 = 100$ . When the points obtained from the Fort Peck and Denison data were considered, it appeared that an additional flattening of the curve was desirable (resulting in reduced wave heights for given fetch and wind velocity conditions). This was even more apparent when consideration was given to the probability that the points obtained from Abbots Lagoon would shift to the left to approximately 70% of their former value (if the method for determining effective fetch proposed herein were followed). Over the range of interest for inland reservoirs ( $10 < gF/U^2 < 4,000$ ), the best-fit curve (curve C) can be approximated by a straight line with the equation

$$\frac{gH}{U^2} = 0.0026 \left( \frac{gF}{U^2} \right)^{0.47} \dots \dots \dots (3)$$

This equation was used to develop the graphical diagram for forecasting wave heights, as shown on Fig. 4.

In general, the points plotted for the dimensionless parameters  $gT/U$  versus  $gF/U^2$  cluster more closely than the points relating wave height to wind velocity and fetch distances. The measurements from Fort Peck and Denison indicate a best-fit curve somewhere between the Sverdrup-Munk curve and the curve indicated by the Abbots Lagoon data. The equation for this best-fit curve

is

$$\frac{gT}{U} = 0.46 \left( \frac{gF}{U^2} \right)^{0.28} \dots \dots \dots (4)$$

for the range of data present for the straight part of the curve to approximately  $gF/U^2 = 4,000$ . In fitting this line to the plotted points, more weight was given to the Fort Peck and Denison data than to the data from Abbots Lagoon, inasmuch as periods obtained by the step-resistance gage were believed to be more correct than period measurements made with a pressure recorder. Eq. 4 was used to compute wave period as a function of fetch distance and wind velocity, as presented in Fig. 8. Based on the assumption that the wave dis-

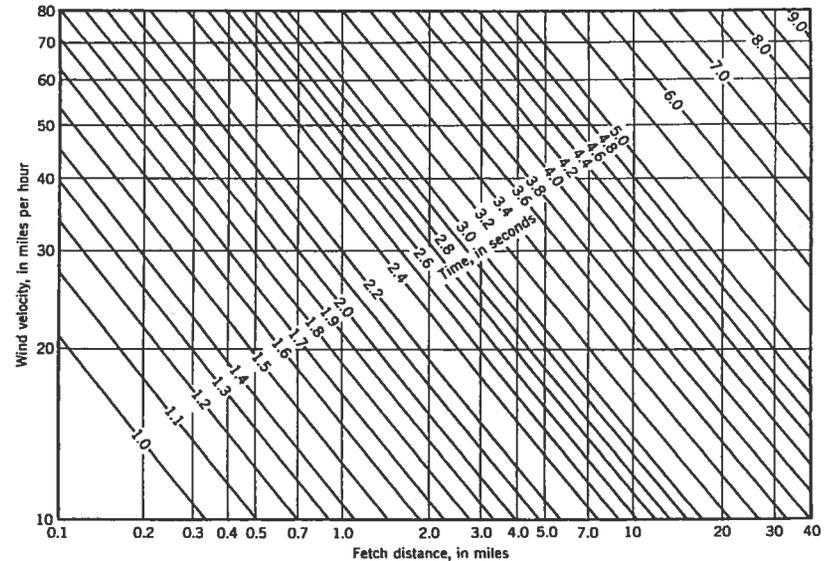


FIG. 8.—WAVE PERIODS

turbance progresses through the fetch at a velocity equal to one-half the wave velocity, the isolines of minimum-time-duration, as shown in Fig. 4, were computed.

The relation derived from the Denison and Fort Peck Reservoirs appears to give consistent results for both reservoirs. When the appropriate parameters are considered, the results also agree closely with those representing ocean-wave generation. Therefore, it is believed that these results may be extended to wave-generation conditions on other inland reservoirs or lakes, provided proper cognizance is taken of the physical conditions of the area that might affect the wave characteristics. The results presented herein, should

be restricted to deep-water generation as they are not applicable to shallow-water generation.

The effect of islands and shoals in the generation area on the waves obtained is difficult to determine at present (1961). Refraction and diffraction analysis may indicate certain effects, but in a generating area these will be largely qualitative (unlike decay areas where approximately accurate quantitative results may be obtained). The effect of broken ice floes during the winter season in lessening wave generation, and dissipating wave propagation remains an essentially unknown factor. Additional work is necessary to determine the effect of different shoreline topography and roughness. Nevertheless, the methods presented herein permit the designer to determine more accurately the wave characteristics that should be considered when estimating freeboard allowances.

#### WAVE RUN-UP ON SLOPES

**Relative Run-up on Smooth Slopes.**—If a deep-water wave reaches the toe of a sloping embankment without major modifications in characteristics, the wave will ultimately break on the embankment and run up the slope to an elevation governed by the slope, the roughness and permeability of the embankment, and the wave characteristics,  $H_0/L_0$ . Wave run-up height,  $R$ , is the difference (vertical height) between maximum elevation attained by wave run-up on a slope and the water elevation at the toe of the slope, excluding wave action. Fig. 9 presents relationships between wave run-up ratios,  $R/H_0$ , wave steepness,  $H_0/L_0$ , and slope of embankment as determined from a large number of hydraulic model tests. The solid-line curves corresponding to smooth slopes were developed from small scale tests<sup>17</sup> conducted by the Beach Erosion Board (BEB) and the Waterways Experiment Station, Corps of Engineers. These curves were corrected for scale effect by an average correction factor for each slope developed from large scale tests by the BEB using waves 2 ft to 5 ft in height.<sup>18</sup> The smooth slopes used in model studies were considered generally comparable to prototype, well-graded earth embankments, that were covered by sod or relatively smooth pavements.

**Relative Run-up on Riprapped Slopes.**—The run-up relations presented in Fig. 9 for rubble mounds are based on small scale hydraulic model tests conducted at the Waterways Experiment Station, Corps of Engineers.<sup>19</sup> The rubble mounds considered in the model tests were quite permeable, corresponding generally to breakwater construction in the prototype.

The run-up ratios indicated in Fig. 9 for rubble mound slopes average approximately 40% of the smooth-slope ratios for corresponding slopes and wave steepness ( $H_0/L_0$ ) values. Inasmuch as riprap surfacing on dams is normally substantially less permeable and relatively smoother than breakwater construction, somewhat higher run-up values may be expected on rip-

<sup>17</sup> "Wave Run-up on Shore Structures," by Thorndike Saville, Jr., *Transactions, ASCE*, Vol. 123, 1958, p. 139.

<sup>18</sup> "Scale Effect in Wave Run-up," by Thorndike Saville, Jr., paper presented at the 1960 ASCE Convention at Boston, Mass.

<sup>19</sup> "Laboratory Investigation of Rubble-Mound Breakwaters," by R. Y. Hudson, *Transactions, ASCE*, Vol. 126, Part IV, 1961, p. 492.

rapped surfaces. In fact, comparatively dense, smooth-riprapped surfaces may closely resemble smooth slopes. Accordingly, in the selection of the wave run-up ratios that are to be used in estimating the height of run-up on specific dams, it will be necessary for the designer to judge the relative relationship between the two extremes of roughness indicated by the smooth and rubble slopes.

In the construction of dams, it has been common practice to use rock that is available locally to surface exposed faces of the dam—to afford adequate

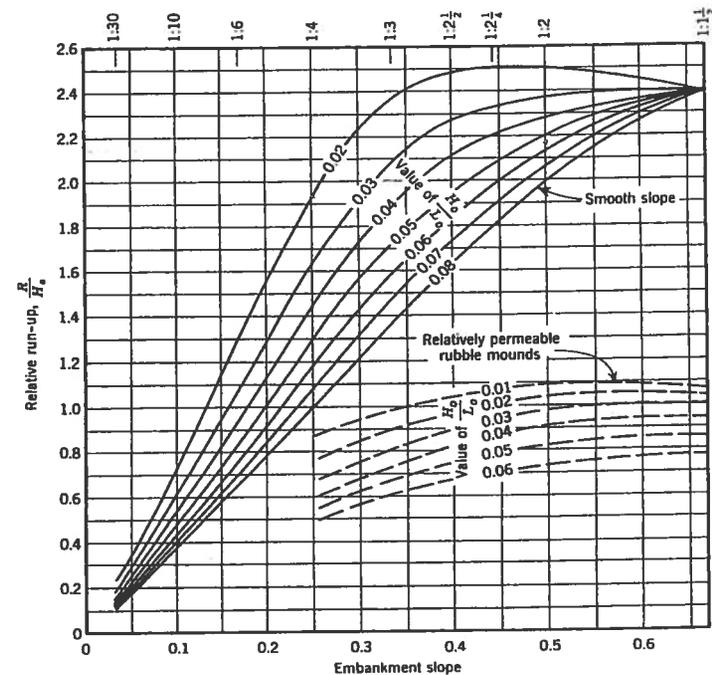


FIG. 9.—WAVE RUN-UP RATIOS VERSUS WAVE STEEPNESS AND EMBANKMENT SLOPES

protection against expected wave action or erosion by rainfall. The effectiveness of this surfacing depends on the size, grading, and durability of the stone, and the care exercised in its placement. In general, riprap surfacing should consist of a graded sand and gravel blanket on the earth embankment, overlain by heavy stone that is properly sized and graded. Criteria widely used in designing riprap surfaces are provided.<sup>20</sup> Sample computations presented

<sup>20</sup> "Earth Embankments," *Engrg. Manual 1110-2-2300*, Corps of Engrs., U. S. Dept. of the Army, 1959.

subsequently, show that riprap provided on the upstream face of the dam averaged 2 ft to 3 ft in thickness, with graded stone ranging from 8 in. to 36 in. in diameter, underlain with a gravel blanket 9 in. to 12 in. thick. This illustration does not imply a uniform standard, inasmuch as designs of riprap surfaces will vary with various physical and economic factors.

It is believed that run-up ratios,  $R/H_0$ , applicable to embankments that are surfaced with coarse riprap generally (as illustrated in the preceding paragraph) should equal approximately 50% of ratios corresponding to equivalent smooth slopes and wave-steepness values  $H_0/L_0$ . However, ratios applicable to riprapp surfaces that are substantially smoother and less permeable should more closely approach values corresponding to smooth slopes.

*Wave Run-up on Structures in Deep Water.*—If waves generated in deep water reach the toe of a smooth embankment without being influenced appreciably by water depths of less than approximately one-third of the wave length, the vertical height of run-up may be computed by multiplying the wave height,  $H$ , by the relative run-up ratio,  $R/H_0$ , obtained from Fig. 9 for the appropriate slope and wave steepness ratios,  $H_0/L_0$ .

*Wave Run-up on Structures in Shallow Water.*—Waves generated in deep-water areas change their characteristics when they reach areas where the depth is less than approximately one-third to one-half the wave length, the height,  $H$ , tending first to decrease slightly, then to increase while the length,  $L$ , shortens. If the depth continues to decrease, the steepness ratio,  $H/L$ , increases until the wave finally becomes unstable and breaks. Theoretically, the maximum wave height cannot exceed  $0.78 D$ , in which  $D$  is the depth of water without wave action.

The distribution of wave energy changes as a wave enters shallow water. The proportion of the total energy in the wave that is transmitted forward with the wave toward the shore increases, while the actual amount of this translated energy remains constant (except for minor frictional effects) until the wave breaks. While passing through the shallow water, prior to breaking, it may be expected that the wave would produce the same height of run-up on a particular slope located in the shallow water as would occur if the structure were located in deep water, because essentially the same energy (that transmitted forward with the wave) is involved. The height of run-up could be computed by entering on Fig. 9 the deep-water wave steepness,  $H_0/L_0$ , whether the structure were located in deep water or in shallow water, provided the wave does not break before reaching the structure. However, if  $H$  and  $L$  are measured in the shallow-water area after they have been altered by the effects of depth, the wave steepness ratio,  $H/L$ , will differ from the deep-water ratio,  $H_0/L_0$ , used as a basis for developing the relations presented in Fig. 9. Accordingly, in using Fig. 9 to compute run-up from waves that are measured in shallow-water areas, the measured  $L$  and  $H$  values must be adjusted to their corresponding deep-water values,  $L_0$  and  $H_0$ , in order to compute the appropriate steepness ratio,  $H_0/L_0$ , for entering Fig. 9. Methods of making such adjustments are explained subsequently.

Case 1.—Assume that a deep-water significant wave,  $H_s$ , 6-ft high and 125 ft long, computed from Figs. 4 and 8 must pass through a reservoir area 15 ft deep to reach a highway embankment slope. Inasmuch as no appreciable additional generation would take place in this short distance, and the wave height is less than  $0.78 D$ , the 6-ft height and 125-ft length may be assumed to be the deep-water characteristics corresponding to the shallow-water

wave, although the latter has somewhat different characteristics. Consequently, the curves in Fig. 9 may be entered directly with a value of  $H_0/L_0 = 6/125 = 0.048$ , to determine the run-up on the embankment.

Case 2.—If the depth of the shallow shelf fronting the embankment referred to in Case (1) had been only 7 ft deep, the 6-ft wave impinging on this shallow area would break because of the depth limitations. The broken waves would tend to reform, and the lower waves in the spectrum would propagate to the embankment. The highest wave stable in the shallow area would be  $0.78 D = 0.78 \times 7 = 5.5$  ft high. This 5.5-ft value may be assumed to approximate with sufficient closeness the equivalent deep-water height, and assuming that the same wave period (or length) is also applicable to this wave, a steepness of  $H_0/L_0 = 5.5/125 = 0.044$  may be used in Fig. 9 to determine run-up.

Case 3.—If the shallow shelf area extends over a several mile reach, so that further generation of the wave will take place, wave characteristics applicable to this shallow area must be computed by other methods.<sup>5</sup> Assume that such a computation shows that a wave 7-ft high and 100-ft long would reach the toe of the highway embankment. For a 15-ft depth of water, a relative depth,  $d/L = 15/100 = 0.15$ , is computed, and from Fig. 10 values of  $H/H_0 = 0.92$  and  $L/L_0 = 0.74$  are obtained. Then,  $H_0$  would equal  $7/0.92$ , or 7.6 ft, and  $L_0$  would equal  $100/0.74$ , or 135 ft. Fig. 9 would then be entered with a wave-steepness ratio  $H_0/L_0$  of  $7.6/135$ , or .056.

#### SAMPLE COMPUTATION OF FREEBOARD

Table 3 illustrates the procedures followed in estimating freeboard requirements as related to the McGee Bend Reservoir project, now under construction on the Angelina Reservoir in southeastern Texas, approximately 100 miles north of Port Arthur. Table 3 is confined to the determination of the freeboard allowances that were considered in determining the elevation of the top of the main embankment section of the dam. Similar estimates pertaining to relocated highway embankments and other structures were prepared in a like manner, except that adjustments for shallow depths were necessary in some cases. Preliminary plans called for an embankment slope of 1 on 2-1/2 at elevations involved in the freeboard computations. Estimates were required for smooth-slope conditions and for an embankment surfaced with coarse riprap.

Having selected the dam as the key location of interest in this illustration (Table 3), the remaining determinations included the following items:

1. Freeboard reference elevations;
2. effective fetch determinations;
3. computation of wave and wind-tide characteristics, corresponding to a range of wind velocities;
4. computation of wave run-up on the embankments, corresponding to various wave characteristics;
5. study of wind-velocity records and meteorological factors to aid in selecting freeboard allowances that are considered to be appropriate; and
6. final selection of freeboard.

Two freeboard reference elevations were considered, namely, an elevation of 173 ft msl, corresponding to the full flood control pool that would have

TABLE 3.—SAMPLE COMPUTATION: HEIGHT OF RUN-UP CORRESPONDING TO SIGNIFICANT WAVES (H<sub>s</sub>) IMPINGING ON MAIN SECTION OF DAM

Winds in Effective Fetch Direction		Deep Water Wave Characteristics (Effective Fetch = 7.5 Miles)					Wave Run-up Elevation, Assuming Freeboard Reference of 173.0' msl				Wave Run-up Elevation, Assuming Freeboard Ref. 183.0' msl					
Average Velocity in mph	Over Water (1.3 x Col. 1)	Minimum Duration	Length, L <sub>s</sub> , in feet	Steepness, H <sub>s</sub> /L <sub>s</sub> , (Col. 4)	d/L <sub>0</sub> (73) (U <sub>10</sub> ) (Col. 6)	Wind Tide in feet (Fig. 2 D = 73)	R/H Ratio (Fig. 9)	R in feet (Col. 10 x Col. 4)	Elev. of Run-up by H <sub>s</sub> Wave (173.0 + Col. 9 + Col. 11)	R in feet (50% of Run-up by H <sub>s</sub> Wave (173.0 + Col. 9 + Col. 13))	Wind Tide in feet (Fig. 2 D = 83')	Elev. of Run-up by H <sub>s</sub> Wave (183 + Col. 15 + Col. 11)	Riprapped Slope	Smooth Slope	Riprapped Slope	
		Required to Produce Computed Waves (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)	Heights, H <sub>s</sub> , in feet (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)	Steepness, H <sub>s</sub> /L <sub>s</sub> , (Col. 4)	Heights, H <sub>s</sub> , in feet (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)	Heights, H <sub>s</sub> , in feet (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)	Heights, H <sub>s</sub> , in feet (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)	Heights, H <sub>s</sub> , in feet (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)	Heights, H <sub>s</sub> , in feet (Fig. 4)	Period, T <sub>s</sub> , in sec. (Fig. 8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
20	26	96	2.8	3.6	66	.042	1.1	0.2	2.06	5.8	179.0	2.9	176.1	0.2	189.0	186.1
25	32	88	3.6	4.0	82	.044	0.9	0.3	2.03	7.3	180.6	3.7	177.0	0.3	190.6	187.0
30	39	80	4.4	4.3	95	.046	0.8	0.5	2.01	8.8	182.3	4.4	177.9	0.4	192.2	187.8
35	46	76	5.2	4.7	112	.047	0.7	0.6	2.00	10.4	184.0	5.2	178.8	0.6	194.0	188.8
40	52	71	5.9	4.9	123	.048	0.6	0.8	1.98	11.7	185.5	5.9	179.7	0.7	195.4	189.6
50	65	65	7.5	5.4	149	.050	0.5	1.3	1.95	14.6	188.9	7.3	181.6	1.2	198.8	191.5
60	78	60	9.1	5.9	178	.051	0.4	1.9	1.93	17.6	192.5	8.8	183.7	1.7	202.3	193.5

ASSUMPTIONS: (1) Location, main section of dam at end of deep-water fetch; (2) Effective wave fetch = 7.5 statute miles; (3) Wind-tide (set-up) fetch = 31.0 miles; (4) Embankment slope = 1:2 1/2; (5) Average elevation of reservoir bottom over 5 mile distance adjacent to dam = Elevation 100 ft msl, as used in wind tide computations; (6) Freeboard reference 173.0 msl is normal full reservoir level, and 183.0 msl is estimated maximum surge level during spillway design flood; and (7) Riprap would be 2 to 3 ft thick, with graded stone ranging from 8 in. to 36 in. in diameter, underlain with a gravel blanket 9 to 12 in. thick.

prevailed for periods of from 10 days to 40 days during five recorded floods, and an elevation of 183 ft msl, representing the estimated maximum reservoir level that might be attained for several hours during the probable maximum flood used in establishing spillway discharge requirements. The pool elevation of 173 ft msl has an estimated average frequency of exceedence of once in 10 yr. The probable frequency of an elevation of 183 ft msl attained under the proposed plan of reservoir operation cannot be satisfactorily determined, but hydrometeorological studies indicate that this level may be attained on rare occasions.

The longest fetch distance over which winds might blow toward the dam follows a generally northwest-to-southeast direction. The overall distance would be approximately 31 miles. However, State Highway No. 147 crosses

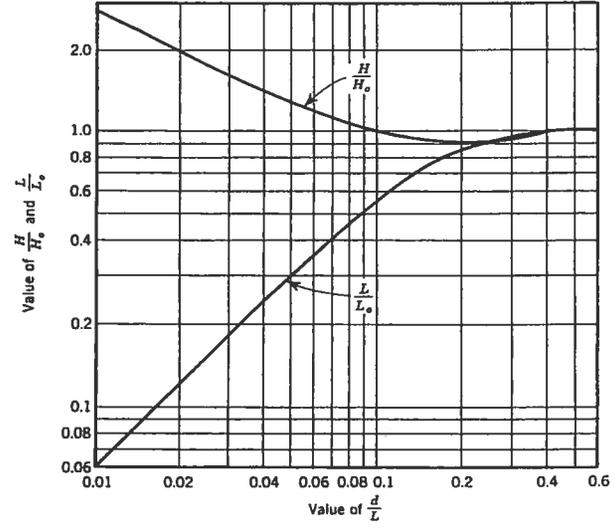


FIG. 10.—RELATIVE DEPTH (d/L) VERSUS RATIOS H/H<sub>0</sub> AND L/L<sub>0</sub>

the reservoir at a point approximately 16 miles upstream from the dam. Investigations indicated that the highway embankment would be of adequate height and section to withstand wave attacks, and thus adequate to limit the maximum fetch distance of waves affecting McGee Bend Dam to 16 miles. However, in determining possible wind-tide effects, the longer fetch of 31 miles was assumed as the preferred or conservative estimate, inasmuch as bridge openings totaling approximately 8,000 ft might permit gradual transfer of wind-tide effects from the upper part of the reservoir to the lower part. This conservative estimate was considered satisfactory because of the relatively small wind-tide estimates obtained for this deep reservoir. Effective fetch distances were computed for three alternative directions of the central radial,

following the procedure previously described, and the results are presented in Table 4.

Although each of the effective fetches listed in Table 4 were considered in reaching final design decisions regarding freeboard allowances needed, subsequent illustrative computations consider only an effective fetch of 7.5 miles in computing wave characteristics, and 31 miles in estimating wind tides.

Computations of wave characteristics corresponding to various wind velocities are summarized in Table 3, and are generally self-explanatory. The over-water wind velocities tabulated in Col. 2 were estimated as being equal to 130% of the assumed over-land velocities; corresponding with approximate relationships shown in Table 2. The estimated over-water wind values should be used in connection with the diagrams presented in Figs. 4 and 8, inasmuch as the diagrams were derived on the basis of over-water velocities.

The depth of McGee Bend Reservoir within a few miles of the dam will be approximately 73 ft below the normal operating pool level of 173 ft msl. As shown in Table 3, the depth of water in McGee Bend Reservoir will exceed

TABLE 4

Computation no.	Central radial line	Computed effective fetch, in miles
(1)	(2)	(3)
1	A-A <sup>a</sup>	7.5
2	B-B <sup>a</sup>	6.6
3	C-C	4.7
4	A-A <sup>b</sup>	8.9

<sup>a</sup> State Highway No. 147 assumed upstream limit of maximum fetch line.

<sup>b</sup> State Highway No. 147 assumed non-existent.

one-third to one-half the wave length,  $L_0$ , in all cases. Accordingly, the wave estimates presented in Table 3 correspond to deep-water waves.

Table 3 summarizes the computations involved in estimating the maximum elevation that would be attained on specified embankments by waves having the significant-wave heights,  $H_s$ , and lengths,  $L$ , assuming the wind-tide effects indicated and no overtopping. The run-up ratios used were interpolated from Fig. 9. The wind-tide effects were read from Fig. 2.

Research studies previously referred to indicate that the wave period,  $T$ , of maximum waves in a reservoir is generally equal to or slightly less than the period of the significant wave. Consequently, the length of waves having a height equal to or greater than that of the significant wave,  $H_s$ , in a particular sequence, may be assumed as approximately constant. Accordingly, waves higher than  $H_s$  will have higher steepness ratios,  $H/L_0$ , which will affect the height of run-up, as illustrated in Table 5 in which  $H_s$  is assumed as 6 ft,  $L_0 = 125$  ft, and run-up ratios are obtained from Fig. 9 for an embankment having a slope of 1 to 2½. Run-ups on the riprapped slope are assumed to equal 50% of smooth-slope values.

Table 5 shows that a substantially lower run-up ratio is applicable to the maximum waves expected in a sequence of wind-generated waves. However,

for the conditions presented in Table 5, the maximum wave run-up on a riprapped slope would be 2.2 ft higher than run-up from the significant wave. Accordingly, some overwash of the embankment would be expected if the crest of the dam were established on the basis of the significant-wave height. The quantity of water involved in such overtopping could be estimated by methods presented elsewhere.<sup>18</sup> With the protection against erosion of the crest provided by the riprapped surface, it is unlikely that serious damage would result from wave overwash from the relatively small number of near-maximum waves. As a general rule, it is considered reasonable to base estimates of freeboard requirements on the significant-wave height and applicable run-up ratios, although the probability of some overwash should be recognized and allowed for if deemed necessary in specific cases.

The wind velocity and duration criteria that should be adopted as design criteria are not subject to precise determination on a rational basis. Records show that wind velocities during periods that are not associated with hurri-

TABLE 5.—SAMPLE COMPUTATION: RUN-UP FROM WAVES EXCEEDING  $H_s$ 

Ratio of specific wave height, $H$ , to significant wave height, $H_s$ , ( $H/H_s$ )	Specific wave height, $H$ , in feet (6 ft x Col. 1)	Percent of waves exceeding specific wave height, $H$ , in Table 1	Wave steepness, $H_0/L_0$ , ( $H/125$ ft)	Run-up on smooth 1 to 2½ slope		Run-up on riprapped slope (50% of Col. 6) in feet
				Relative run-up, $R/H_0$ (Fig. 8)	Run-up, $R$ , in feet	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.67	10.0	0.4	.080	1.64	16.4	8.2
1.40	8.4	2	.067	1.75	14.7	7.4
1.27	7.6	4	.061	1.82	13.8	6.9
1.12	6.7	8	.054	1.90	12.7	6.4
1.00	6.0	13	.048	1.98	11.9	6.0

canes may equal 40 mph to 50 mph over McGee Bend Reservoir for durations of 1 hr on infrequent occasions. One-hour average velocities in the order of 25 mph to 35 mph have been recorded on a relatively large number of occasions. Velocities approaching these values may continue for a few hours, but the directions tend to shift appreciably and may or may not coincide with the critical fetch for the periods indicated. However, wind velocities approximating the magnitude referred to herein (25 mph to 35 mph) have a reasonable probability of coinciding with an operating pool level of 173 ft msl, and might coincide with the maximum reservoir level obtained during the spillway design flood.

Hurricane analyses show that wind velocities of approximately 60 mph or greater may occur over the McGee Bend Reservoir for durations of a few hours, and that such velocities may occur from any direction. It was considered reasonable to assume that such velocities might coincide with reservoir levels of 173 ft msl, which may prevail for 10 days to 40 days. Although hurricane winds may coincide with maximum reservoir levels attained during the probable maximum flood, the possibility was considered too remote to warrant consideration as a basis for freeboard selection.

The maximum reservoir level that may be attained during the spillway design flood was estimated to be 183 msl, exclusive of any wave effects. If an overland wind velocity corresponding to 35 mph should coincide with the critical fetch, a maximum run-up elevation of 189 ft msl on a riprap slope would be expected from waves corresponding to the significant wave height,  $H_s$ . Some overtopping of the embankment would result from waves exceeding  $H_s$ , but the duration would be short. If all computations were accepted at face value, the top of a dam would have to be situated at approximately 191 ft msl to avoid wave overtopping. If the top of the embankment were established on this basis (non-hurricane winds coincident with the maximum spillway design flood surcharge) requirements based on the assumption that hurricane winds coincide with a freeboard reference elevation of 173 ft msl would not be controlling, as may be observed by comparing cols. 14 and 17 on Table 3.

The computations of wave characteristics and run-up as described herein provide the design engineer with useful information for his consideration when working toward final decisions regarding the determination of appropriate freeboard allowances that are to be included in establishing the top elevation of a dam. However, other factors should be considered in conjunction with these estimates, for example, the degree of risk associated with possible wave damage to structures involved, the resistance of the structures to damage, the variations in operation and maintenance costs corresponding to alternative allowances, and the relative costs of protecting embankments against erosion from limited wave overtopping as compared with the costs of raising the embankment to prevent overtopping.

#### EMBANKMENT OVERTOPPING RESULTING FROM WAVE RUN-UP: QUANTITATIVE ESTIMATES OF WATER

If the freeboard allowance on an embankment is limited to the height necessary to avoid overtopping by the significant wave,  $H_s$ , in a particular series, some overtopping may naturally be expected from run-up of waves exceeding  $H_s$ . If the relationships between design-water level, height of embankment, and other conditions are such that severe wave attack will be fairly frequent, special drainage facilities or other appropriate provisions will be required. In such cases, quantitative estimates of the overtopping expected from wave run-up will be necessary. Such estimates are particularly important in connection with the design of sea walls for protection of low-elevation areas against storm surges caused by hurricanes, where the wave attack is often sustained for long periods of time. In some cases, expensive pumping stations and other interior drainage facilities are necessary to avoid excessive damage from accumulations of water within the protected areas.

Extensive hydraulic model studies have been performed by the Waterways Experiment Station, the BEB,<sup>21</sup> and by other investigators to develop proce-

<sup>21</sup> "Shore Protection Planning and Design," Tech. Report No. 4, Beach Erosion Bd., Corps of Engrs., U. S. Dept. of the Army, 1954.

dures and generalized relationships suitable for estimating quantities of water to be expected from overtopping of embankments.

#### CONCLUSIONS

The characteristics of wind-generated waves in reservoirs affect the run-up of waves on embankments, and are basic considerations in establishing freeboard allowances. A study of the relationships between surface winds and waves produced in deep inland reservoirs has shown these relationships to be basically the same as those in ocean waters, but the influence of certain physical features of reservoirs necessitates the use of modifying factors, or a somewhat different generalized relationship. Of particular importance are the effects of fetch width and water-land roughness differences on wind velocities at water surfaces.

#### ACKNOWLEDGMENTS

The measurement program and the resulting data presented herein were obtained from research conducted primarily under the Civil Works Investigation Program of the United States Army Corps of Engineers by the Missouri River Division and its Fort Peck District, the Southwestern Division and its Tulsa District, the Beach Erosion Board, and the Office of the Chief of Engineers. The permission of the Chief of Engineers to publish this information is appreciated. Corps personnel to whom particular acknowledgment is due for their extensive work on this program are G. C. Kelley and Paul Veale, then of the Tulsa District; A. M. Franklin, of the Missouri River Division; R. N. Wilson and C. B. Pletcher of the Office of the Chief of Engineers; and C. L. Bretschneider, then a consultant from Texas A. and M. The conclusions reached and methods presented herein are those of the authors and they do not necessarily reflect the policy or views of the Corps of Engineers or the Chief of Engineers.

#### APPENDIX I.—NOTATION

The following symbols have been adopted for use in this paper:

D	= depth of water without wave action;
F	= fetch length, in statute miles;
H	= height of any specified wave, measured from trough to crest, in feet;
$H_{ave}$	= average height of all waves in a steady-state series;
$H_{max}$	= "maximum" wave = average height of highest one percent of waves in a steady-state waves;

- $H_o$  = height of deep-water waves;  
 $H_s$  = significant wave height;  
 $K$  = dimensional constant related to shear stress (Eq. 1);  
 $L$  = wave length, measured from crest to crest, in feet;  
 $L_o$  = wave length in deep water =  $5.12 T^2$ ;  
 $N$  = planform coefficient (Eq. 1);  
 $R$  = run-up;  
 $S$  = wind tide or wind set-up, in number of feet above stillwater elevation in a reservoir without wind action;  
 $T$  = wave period, in seconds;  
 $T_s$  = significant wave period, in seconds;  
 $t$  = wind duration;  
 $U$  = wind speed, in statute miles per hour;  
 $U_{land}$  = overland wind speed;  
 $U_{water}$  = overwater wind speed;  
 $V$  = wind velocity, in miles per hour; and  
 $\theta$  = angle between the wind and the fetch.
- subscript:
- o = deep water.

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 Paper No. 3474  
 (Vol. 128, 1963, Part IV)

## STABLE CONCRETE BLOCKS ON RUBBLE-MOUND BREAKWATERS

 By S. Nagai,<sup>1</sup> M. ASCE

## SYNOPSIS

Data concerning hollow square concrete block, with four legs, is presented herein. This concrete block has much greater stability from wave attack than earlier specially-shaped concrete blocks, in addition to its distinguished ability for absorbing wave energy. The great effect of rubble mounds that are covered with two layers of the hollow-square and the hollow-tetrahedron armor units on the attenuation of shock pressures and wave overtopping exerted by breaking waves on breakwaters and seawalls has been proved in laboratory tests and, partly, in prototype tests.

## INTRODUCTION

As of 1962 large sizes of rectangular concrete blocks or stones have been in use for several decades to prevent scouring at the seaside bottom or slope of breakwaters and seawalls. These rectangular concrete blocks and stones are able to resist sliding or overturning caused by wave attack by their own weights, but they can scarcely decrease wave pressure and overtopping exerted on the vertical walls of breakwaters and seawalls.

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Note.—Published essentially as printed here in August 1962 in the Journal of the Waterways and Harbors Division as Proceedings Paper 3230. Positions and titles given are those in effect when the paper was approved for publication in Transactions.

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**U.S. Army Corps of Engineers  
Jacksonville District  
August 2013**